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ABSTRACT

Research findings on college instruction and basic skills deficiencies are discussed in 12 papers from the first Regional Conference on University Teaching. Titles and authors are as follows: "Basic Skills: Dealing with Deficiencies" (Susanne D. Roueche, with responses by Gary B. Donart, Betty Harris, and James Nordyke); "Is Higher Education an Education Process or a Screening Process?" (Martin J. Blake); "A Model for the Development of Content-Area Basic Skills Courses and Its Implementation at a Liberal Arts College" (David E. Borrebach, Mark O. Farrell, Frederick Sproull); "Literacy and Writing: Making 'The Connection'" (Victoria C. Duckworth); "Critical Reading Deficiencies--Cause, Scope, Remediation" (Gerard Giordano); "Components of a Model Developmental Studies Program" (Michael T. Hoban); "Improving the Basic Skills of Beginning Teachers Through the Use of Follow-Up Studies of Teacher Education Program Graduates" (Edward L. Kirk); "The Importance of Writing to Chemical Engineers" (Richard L. Long); "Cognitive Modifiability for Indian Engineering Students" (C. Lance Lujan, Marjorie Burr); "Teaching Critical Thinking in Higher Education" (James P. Marshall); "Working with Nontraditional Students: Women in Transition" (Kathleen O'Connor, L.J. Aasheim); and "An In-House Training Program to Correct Mathematics and Chemistry Deficiencies at Los Alamos National Laboratory" (Helena Whyte). (SW)

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BASIC SKILLS: DEALING WITH DEFICIENCIES

by

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Basic Skills: Dealing with Deficiencies

My experiences with developmental education began in the mid-60s when I began teaching at El Centro College in Dallas, Texas. I was fortunate to be welcomed as a developmental education teacher--at least by the administration--into a college administered by a president and deans who firmly believed the our remedial/developmental students were as important as any other students on that campus; their welfare was of great concern to those in charge of that college. The faculty, counselors, and students in our little department enjoyed a fiscally-safe, comfortable setting; we were genuinely awarded security and status in a time when teachers of remedial courses were not so well-regarded (in fact, there was usually some suspicion--sometimes voiced--about one's intelligence and "real" qualifications for teaching in college if these were your assigned courses). As I became familiar with other developmental programs around the country and as we became almost a national laboratory for visitors interested in designing their own, I was amazed to find that I was in a unique situation. Later on, I realized that one of the essential ingredients to our success was the characteristic that Texans like to assign to themselves; we were a very "can do" group--we simply did not know what we couldn't do! And that was a very real advantage in those days! In fact, thinking back on them, I am amazed that we entertained such "Pollyanna" ideas. To illustrate, a wonderful woman on our developmental faculty was putting several children through college; she was especially dependent upon getting that paycheck at the first of every month (she wasn't alone, I must confess, just somewhat more desperate than the others). And she was especially concerned for several years that we were doing too good a job--that is, we were doing such fine work with these low-achieving students <u>that we might just be working ourselves right out of a job!</u> I recall that, in fact, we all shared some ideas that this could well

happen and that we should give serious thought to other courses that we might wish to teach next. But, sadly, she was absolutely dead wrong! It seemed that that harder we worked, the behinder we got. What we found was that we had a very successful program by anyone's standards--and particularly by the national standards--as 90% of our students were successful in that program and a large percentage made it elsewhere as well. But our problems were growing.

Just as we thought that we had identified the nontraditional student and were making a significant dent in meeting their needs--we could accommodate the students that were needing our help--we began to find that numbers of more traditional students were demonstrating skill levels that looked, strangely and surprisingly, more and more like (upon assessment) the less academically prepared students that we were most accustomed to seeing in our classrooms. By the time I left El Centro, we were one of the largest departments on the campus.

Some of our experiences on the national level provided glimpses that we were not alone. I recall that in the late 60s, my colleague and I were in a limousine carrying several college/university English teachers to a CCCC's meeting. We overheard them talking among themselves about the program, that this year the conference coordinators had--great horrors--scheduled a workshop on remedial education, and they wondered just how many of these "remedial types" would be in attendance! Only five years later, the CCCC's program listed more remedial/developmentally-focused workshops than workshops with more "traditional" themes.

A Brief History

In 1968, an in-depth study of early remedial efforts in college found that very few of the students who were placed in remedial courses ever completed them; in fact, 90% either failed or withdrew. Sometimes these courses were required; sometimes they were merely offered, but the results were always disastrous as early programs were usually very poorly conceived and very poorly

implemented. In fact, very often the early remedial programs were either "watered-down" versions of the regular college courses or were unreasonable facsimiles of elementary school courses that were badly redesigned for adult learners (Roueche, 1968). A study in 1973 again studied developmental programs and identified successful programs in five community colleges and highlighted the components that appeared to be common elements. This study found that the students persisted at high levels to program completion and that they were, indeed, learning to read, write, figure, and study well enough to enter other college courses and do well there. Furthermore, it was discovered that faculty who taught these courses brought much enthusiasm and high expectations for student success into these classrooms. Above all, the results documented that low-achieving adults had simply never been taught--that they did possess the abilities and motivation to be literate; they simply had not been prepared well academically (Roueche and Kirk, 1973).

A follow-up study in 1977 looked once again at developmental programs in hopes that--through careful documentation on the part of the institutions--there would be proof that these programs were making a difference and that students were successful in those programs and in subsequent courses. While discovering several successful programs in both colleges and universities, the researchers found that most institutions could not document program success. That is, although their curriculum and policies were based upon premises that students could learn and that they should be appropriately placed in courses where they could receive adequate preparation for college-level work, most of these institutions could not report how many students completed the developmental program, how many persisted in regular college courses and with what success, and whether or not the developmental effort was of any value either to the student or to the institution (Roueche and Snow, 1977).

During these years, reports continued to surface that many of the most selective and prestigious universities were experiencing a major problem with students who could not demonstrate basic skill levels that were acceptable for college-level work--yet their high school transcripts reflected, ostensibly, very solid work! For instance, Stanford had established a learning assistance center in 1972 for the provision of remedial programs, and it found that within four years, 50% of its freshmen were receiving academic assistance and guidance. In 1975, the University of California was requiring remedial writing of at least 50% of its students--students drawn from the top 12.5% of California high school graduates. Strangely enough, that same percentage of students were assigned remedial writing courses at Bronx Community College--a college admitting three-quarters of its students from the lower half of New York City high school graduating classes (Maxwell, pp. 229-30).

The NIE Studies

In 1979, the National Institute of Education funded two three-year, in-depth investigations of literacy development in selected community colleges in Arizona and Texas; funding went to the Arizona State University and the University of Texas at Austin. The parallel research studies were looking at literacy development strategies in all programs and courses at these colleges--not just the developmental courses. The studies were conducted independently of each other, but their findings were remarkably and sadly similar.

Both studies discovered that students were expected to read and write more frequently and with more precision in the developmental--or basic skills--courses than they were ever required to do again (in regular courses). In fact, the two studies documented that students in these colleges were rarely expected to demonstrate literacy skills that had been traditionally regarded as expectations for college work (Roueche and Comstock, 1981; Richardson and Martens,

1982). To be more specific, reading and writing assignments requiring more than brief skirmishes with written language were rarely made in any regular college courses; a large percentage of the students in any class never bought the text or lab manual as they had discovered early on that reading these materials was unnecessary for successful course completion; many instructors never made assignments in the text, and if they did they never evaluated that reading; fragmented pieces of information would be carefully identified as "important" reading or would be included on hand-outs and would appear in similar fashion on the next examination. Typically, students were required to do little more than recall and produce very fragmented, disjointed pieces of information. I and my colleagues in the UT study did discover that in courses with value, use, interest, and relevance to students' personal learning goals, they were much more likely to produce work at higher levels than was expected in the minimum requirements. In those more general courses where the content was of no perceived value or interest and had no clear relationships to any other coursework, students were more inclined to accomplish only minimum requirements and do so badly.

Another discouraging joint finding was that instructors infrequently talked to each other and could not generally articulate relationships between their course content/demands and/or any other courses required of students in and out of that discipline. General education courses (Freshman English, for example) taught writing styles and models that were never used again by students. In other words, there was little, if any, knowledge about the language requirements and applications in those courses for which they were ostensibly preparing students. As a result, it is obvious that we found little evidence of application or transfer of language skills from these general and/or developmental courses to any others in the college curricula.

One of the most unsettling joint findings was that of the isolation

of the basic skills instruction from the rest of the college curricula. That is, the reading, writing, and math courses were very often taught without any identified relationship--or apparent regard for--any other courses for which students would enroll. It was as though the skills could be taught outside of any meaningful context--that they were somehow important learnings all by themselves.

By and large, both studies demonstrated that attention must be paid to reasonable levels of literacy skills in all courses and programs. They shared a concern that instructors--faced with great diversity in the classroom--(no mandatory placement for basic skills development prior to enrolling in regular classes) were resorting to reducing instruction to the lowest cognitive levels--rather, demanding little if any demonstration of acceptable basic skills. The vicious cycle was obvious!

The University of Texas Study

During the spring and summer of 1982, Drs. John Roueche and George Baker, and I, conducted a national study of college and university responses to low-achieving students. This study was the first of its kind and surveyed all community, junior, and technical colleges, as well as all senior institutions awarding the traditional associate, baccalaureate, and graduate degrees. Of the 2508 surveys mailed, 1489 were returned, of which 1452 were usable. Of that total, only 160 institutions reported that they had no basic skills programs, courses, or alternatives for serving low-achieving students. It must be mentioned, at this point, that of those 160 institutions reporting no basic skill development activities, several have been featured in professional articles about their own existing developmental efforts and/or the problems that they are facing with the increasing numbers of students demonstrating poor skill levels. As well, several of their staff and faculty have been quoted as to their personal institutional concerns about the growing national literacy

problem and the fact that there is dramatic evidence of same on their campuses. While we can only speculate about why these institutions chose to respond as they did, the responses merely convinced us further that no matter what the response, there are multitudes of all levels of postsecondary educational institutions that are being hit squarely in the nose with a growing problem.

This survey sought answers to the following questions: what is the magnitude of the literacy problem that colleges and university are facing? what institutional efforts are in place to devevelop basic skills? how effective are these efforts? what are the common elements of reportedly successful programs and courses?

Unfortunately, it was difficult to identify successful programs from survey responses; institutions were noticeably lax in collecting and reporting retention in their follow-up data. Therefore, the inconsistency of these responses provided a very tenuous base for making evaluations of program success. In fact, most of these responses led us to suspect that the retention information was most likely someone's guess about how well the programs were serving students. We found that the institutions that did collect retention data most typically were recording only retention figures for the basic skills program, not the figures for students who were successful in courses taken after completing the basic skills sequence. We did, however, communicate directly by phone and in writing with those programs that reported 50% or better retention in basic skills programs.

From these personal interviews, we gathered enough additional data to infer some elements of success: that is, we identified those elements that (1) appear to best predict success with low-achieving students, and (2) are most characteristic of basic skill courses that report successful outcomes. Our additional data, in combination with initial survey responses, provided us with eleven elements that we identified as being common to reportedly success-

ful programs. They were: strong administrative support, mandatory counseling/assessment/placement, structured courses, award of credit, flexible completion strategies, multiple learning systems, volunteer instructors, use of peer tutors, monitoring student behavior, interfacing with subsequent courses, and program evaluation (Roueche, Baker, Roueche, 1984; Roueche, S., 1983; Roueche, J., 1984).

Administrative Support. Successful programs and courses are provided strong administrative support. Board policies, college and university catalogs, and student handbooks include statements that the institution plans to share the responsibility for the success of its students and translate those statements into such activities as student assessment and placement into appropriate courses and college interventions when poor academic performance threatens students' continued enrollment in the institution. A notable example of this support is in practice at Miami-Dade: an institution-wide (including basic skills courses) strategy for improving retention, the Academic Alert System notifies students--after approximately one-third of the semester--who are not performing at acceptable levels in their course work. Notification includes instructions about recommended action: students are to see a particular counselor or tutor on a specific day, at a specific time. There is some proactive effort to remedy the causes of the student's academic difficulties before it is too late. Enrollment practices at Duke University and at the University of Arkansas at Little Rock (to name but two) require students to take basic skill courses--if assessment indicates that they are needed--prior to enrollment in any other college courses: taking the basic skill courses is a condition for enrollment; and at the University of Arkansas, there is a formal contract drawn between the student and one of the academic deans about this required plan. Breaking the contract means suspension from the institution and no permission to re-enroll.

Mandatory Counseling and Placement. These institutions go beyond

merely writing about strong support--they require mandatory assessment and placement! Students, upon entering the institution, are tested for basic skill development; and based upon the results of these tests, they are advised and then placed into courses designed to prepare them for college-level work. In fact, the mandatory assessment and placement means that students with reading/writing/math deficiencies will not be allowed to enroll in any courses where those skills are required until the institution determines that performance is at the appropriate level.

Mandatory counseling includes making additional requirements of students. Students may be allowed to take only an acceptable number of course hours in light of family and work responsibilities and assessment test results. It is understood that enrolling a student in a full-time schedule when outside responsibilities threaten to negatively affect academic performance is professionally irresponsible. Counselors also tend to rely less heavily on high school grades as indicators of students' abilities to succeed in college and rely more heavily upon standardized tests--e.g., SAT, ACT--as measures of academic potential. However, because the standardized tests merely indicate where there are basic skill problems--that is, they identify students without providing specific problem areas--institutions are attempting to use more on-site testing for an in-depth analysis of deficiencies. These analyses may be made during the orientation or the registration period and/or once the student is in the basic skills course.

Structured Courses. While we found that institutional size was a major contributing factor in determining programmatic structure of the basic skills effort, all of the courses were very structured, very organized. For example, the courses would meet regularly, student performance was monitored, and strict attendance policies were in effect. These courses typically carried grading systems that included one non-punitive grade--to be given to students making acceptable progress but not yet meeting exit requirements. The "progress"

grade protects the student from academic suspension and gives him additional time to meet course requirements. Again, institutional size appears to be a factor: while courses may be housed in separate developmental departments, they more frequently are housed in separate academic departments in the smaller institutions. In larger institutions, they are usually housed in learning resource centers which serve the rest of the institution as well.

Award of Credit. In these more successful programs, course credit was awarded either as transcript credit (institutional) or as credit that would apply toward degree. If degree credit was awarded, the basic skills course was considered an elective that fulfilled one of the degree requirements.

Flexible Completion Schedules. These institutions have some procedure whereby students can continue their basic skills course work into another academic semester or quarter without returning to the beginning of the skills cycle; that is, students re-enroll for the skills course, but their work for that semester begins where they left off in their prescribed work plan. While not nearly so common a practice, many colleges allowed students to enter the basic skills courses at any time during the semester, and many others would allow students to leave the courses with their earned grade any time during the academic semester/quarter. However, they did not allow students to continue indefinitely in basic skills courses, but rather they had some reasonable time frame in which the students were allowed to work toward achievement of their own skills goals.

Multiple Learning Systems. A variety of learning systems were evident in these programs. Students would work from prescriptions that were carefully written after the initial assessments were completed, they were involved in learning activities that were based upon clearly-drawn performance requirements, they were using self-paced modules as well as being engaged in group instruction, and they were using pre- and post-tests to move through

their prescribed work. Instructors were not using the lecture method as the primary mode of instruction, nor were they relying primarily on self-paced modules--both instructional extremes proving ineffective with these students. Rather, they would have a varied number of strategies available in any class period to keep student interest high and to accommodate the diverse learning styles that were represented in these classes.

Monitoring Student Behaviors. Students are not merely enrolled in these basic skill courses; they are assigned specific work that is carefully monitored-- often on a daily basis. There was frequent use of peer tutors who had been trained to work with low-achieving students and were evaluated regularly themselves; these tutors allowed the instructor time to move more freely around the class as well as provided students with more individual attention during class sessions and in regularly-scheduled blocks of time outside of the class meetings. Intervention strategies were common when student problems surfaced--e.g., excessive absences, failure to produce assigned work, failure to meet acceptable standards of performance. Some of these intervention strategies required teachers or peer tutors to call students with assignments or assignment updates, to encourage them to return to class, and to schedule tutoring time or additional work to help them return to their work schedule with as little disruption as possible.

Volunteer Teachers. These courses were taught by instructors who volunteered to teach the basic skills students. They had met carefully predetermined instructional criteria; however, in the final analysis, they had made the decision to teach low-achieving students. Most developmental skills faculty are full-time in their disciplines and teach regular academic and skills courses during the same academic calendar. They receive staff development training in working with low-achieving students; typically, as well, their classroom performance is evaluated by students and administrators.

Interfacing with Subsequent Courses. Administrators and instructors of these courses assessed the reading, writing, and math requirements/demands that subsequent courses make on their students; and they designed course content and strategies around these findings. These modified needs assessments identify generic and specific skills. Frequently, assessed needs are formalized and written as exit criteria for the basic skills courses.

Program Evaluation. While most of the responding institutions acknowledged the importance of program evaluation, few had any procedures that automatically and routinely gathered the kind of retention data that we sought. They did, however, include in their plans for the future, the intent to develop improved retention strategies and assess their effectiveness. When evaluation data were collected, they were woefully inadequate to describe the outcomes of institutional efforts to respond to these students; furthermore, as was mentioned earlier, the data that were collected typically described basic skills completion and not student success in subsequent academic work. Student success in subsequent work is the crucial test of the basic skills program; it is this data that provides the best evidence about program effectiveness!

Many of these institutions described tangential outcomes of plans for improving data collection procedures--efforts to research, plan, and implement procedures whereby students could be retained longer and with more success; improved pre-assessment strategies to identify low-achieving students prior to their enrollment in any courses; improved intervention strategies during the first semesters to identify and provide appropriate counseling/tutoring to potential drop-outs; improved interfacing with subsequent courses for improved curriculum and instructional development; and a design of discriminating exit interview procedures aimed at identifying problem areas for those students who are not successful in basic skills courses or subsequent academic work.

So Where Are We Now?

Rumors of this general instructional distress over great classroom diversity comes from all colleges and universities alike. There appears to be nothing on the horizon which suggests the situation will change any time soon. While standardized test scores are improving slightly and there are reports that students in many public junior high and high schools, colleges, and universities are being challenged to accomplish higher levels of work, there are other specifics that are frightening. For example, in 1981, the National Assessment of Education Progress (from the Office of Education) discovered that the average high school student spent less than two hours a week on homework. The last week of November, 1984, our Austin American Statesman reported on a recent release of Census Bureau information (reporting on an annual survey of school enrollment); data indicated that the median time spent on homework for elementary and high school children was 5.4 hours per week or one hour and five minutes each school day. The study also reported 12.8% of the students said that they never had any homework at all! Time on task is still woefully underrated--if these are accurate figures!

Since 1970, American high school students have been demonstrating declining skill levels--e.g., the average reading level has declined from tenth grade in 1970 to slightly below eighth grade this last year--a national average! The average high school grade has increased from a C to a B+--in spite of the accompanying evidence that skill levels have not increased as well. What this means to colleges and universities is obvious!

The University of Texas is a selective university, yet it serves more than 8,000 students each semester in its skill development lab. Richard Lanham, a UCLA Writing Program Director, writes:

> From 40 to 60% of approximately 4,000 entering UCLA freshmen--the top 12% of all California high school students--currently fail the English Proficiency Examination.
>
> Basic skills are the University's business right now because our

> students don't possess them. College students read and write like high school sophomores, law students (if you are lucky) like freshmen, and a high school principal crows with glee when his graduating seniors read at ninth grade level ("UCLA vs. The Literacy Crisis," The UCLA Monthly, published by the UCLA Alumni Association, April, 1982.)

In 1981-82, the state of Georgia spent more than $6,000,000 on developmental studies in 33 public colleges and universities; Ohio reports that it spent between 10 and 12 million dollars on its colleges' remedial program (Time, p. 72). More recently, October, 1984, a report, The Evaluation of Remedial Programs, Courses, and Services in California Community Colleges, was released. It included these figures from the California Postsecondary Education Commission report (Promises to Keep: Remedial Education in California's Public Colleges and Universities--CPEC, 1983): 45% of the enrollment in English is now what colleges define as remedial reading and writing; remediation in community colleges in 1980 and 1981 cost 66 million dollars. But California is fighting back. This latest report features data from present models of program evaluation, summaries of findings, and reports of on-going studies (completion dates, names and addresses of researchers included).

Our national consortium of community colleges, the National Institute for Staff and Organizational Development, provides us with daily feedback about what other colleges and universities are doing to better serve low-achieving students and to upgrade their entire college curriculum. For example, the City Colleges of Chicago--in an effort to lower their attrition rate, conducted their own research on the relationship between attendance and achievement. (You can guess what they discovered!) They printed the results of this research in clear, simple, succinct poster-type language and put these flyers all over the college for students and instructors to see (Easton). Instructors in Kentucky colleges are discovering successful instructional parallels between coaching football and teaching academics (Fisch). A community college dean of instruction in Oregon demands that the reading level of any textbook be

included on the order form that is submitted to the bookstore--no level indicated, no order! Paired with knowledge of the reading level of the students in their classes, this information provides strong indicators to instructors as to the success students will have negotiating the text (Weber). Writing across the curriculum programs in Arizona use "collateral graders" to evaluate papers from all classes--regardless of discipline--by a standard measure and as one effort to monitor and improve the numbers and quality of written assignments across the college in all classes (Landsburg and Witt). These assignments are expanded to include essay tests--in lieu of multiple choice, fill-in-the-blank, and true-false tests that are the more common modes of evaluation these days. Reports of serious interest in active engagement with literacy issues are exciting!

But where we find ourselves now, generally, is--as we say in Texas--"between a rock and hard place." We may be opposed to teaching basic skills at the college and university levels (and these are not the places for it in the traditional sense), but we cannot hope to be out of this basic skills business anytime soon if we hope to stay in the business of providing traditional college-level instruction--if that instruction is characterized by the same high standards of literacy that we have come to expect and demand in the past. However, there is no need to reinvent the wheel if you are in the position of planning or implementing a basic skills program; models are ready and widely available--components of which may work very handily in your own institution. National surveys, such as the one we have recently completed--if regularly updated--should better assess the "state of the art" nationally and provide some benchmarks of skill development progress; national forums and conferences such as this one continue to be major support groups for sharing the design and implementation of instructional strategies for fighting the literacy problem.

Terry O'Banion, Executive Director of the League for Innovation in Community Colleges, recently wrote "Confessions of a Technologically Disabled

Person." In it he describes his early childhood in southern Florida and memories he has of going over to his grandfather's house every Saturday night and listening to the Grand Ole Opry on the battery-powered radio. He was not certain how the radio worked--or how they were able to get all of the stars in that little box--but he sure enjoyed hearing Ernest Tubb sing "I'm Walking the Floor Over You." He confesses that perhaps his grandfather didn't understand the workings of that radio either because he never threw away any of the batteries when they wore out; he just threw them over into the corner of the smokehouse. Terry recalls how, one long hot summer afternoon as a seven-year-old boy with a very rich imagination, he laid on the smokehouse floor, poking away with a stick at the large pile of rusting batteries, trying to prod ol' Ernest into singing one more "I'm Walking the Floor Over You."

I sometimes feel that we educators have been poking away at some rusty old batteries ourselves, making assumptions about how we ought to teach the basic skills and to what ends. But we just can't afford that luxury anymore! Luckily, we live in good times for sound curriculum development--we have presses both inside and outside our institutions to improve our services (and some of those pressures are not very comfortable, and they are frequently made by people outside of the educational institutions). But they are good presses; they will cause us to re-evaluate ourselves and our profession and our performance! We have a growing body of research that identifies successful strategies and models for effective courses and programs. We have resources outside of the educational enterprise; Pat Cross suggests that we all re-read the Peters-Waterman book on excellent companies--companies that strive to make winners out of ordinary people and <u>do</u>! The parallels to education are dramatic! I would commend our latest national study to you as an excellent resource for program planning. Finally, I would urge you to forget any lingering ideas that you may still be harboring that your institution simply does not have a literacy problem. In

fact, I would urge you to seek out the answers you may have to those lingering questions about the size of that problem--it does exist! If you are currently into implementing basic skill programs, I commend you and hope that some of these aforementioned resources will be helpful. In any event, it is good to be with an audience of individuals who are choosing to be part of the solution and not a part of the problem. Much good luck to you!

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BIOGRAPHY - SUANNE D. ROUECHE

Suanne D. Roueche is currently at the University of Texas at Austin where she is Editor, Innovation Abstracts, National Institute of Staff and Organizational Development, Program in Community College Education.

She received her B.A. (1964) and an M.A. (1967) from North Texas State University and her Ph.D. (1976) from the University of Texas at Austin.

Dr. Roueche has held a variety of positions at the Austin campus which have included the following: Director, Community College Teaching Internship Program; Director of a NIE project; and Lecturer in Educational Administration.

In 1979, Dr. Roueche was named Kentucky Colonel by Governor Julian Carrol and the Kentucky Legislature for contributions to Kentucky higher education.

Dr. Roueche's most recent publications have included "Studying Attrition by Studying Probation," Innovation Abstracts, Vol. V, No. 34, The University of Texas at Austin, Nov. 18, 1983; and (with John E. Roueche and George A. Baker), College Responses to Low-Achieving Students: A Report on a National Survey, N.Y.: Media Systems, Inc., 1984.

DEVELOPING BASIC SKILLS AT NEW MEXICO STATE UNIVERSITY

by

Gary B. Donart

New Mexico State University

DEVELOPING BASIC SKILLS AT NEW MEXICO STATE UNIVERSITY

GARY B. DONART

In response to the presentation given by Dr. Roueche, I would like to reflect on some personal feelings and impressions developed from conversations with fellow faculty members. Remedial education at New Mexico State University is a new effort. Not counting the Drop In Laboratory, which is designed primarily to assist those with minimal educational deficiencies, and programs such as COPE, remedial coursework has been in effect for about six years.

At the time the remedial requirements were implemented, I advised few freshmen students. Only a small percentage of the freshmen were remedial by the established standards. A great majority of the faculty on this campus did not advise freshmen and were not really aware of what was happening. Memoranda were distributed to advisors explaining the remedial standards. With the issuance of the memoranda, one assumed administrative support as the criteria were implemented and printed in the catalog. Most faculty were still basically unaware of the criteria, the rational, or the extent of the problem.

During the past few years I have worked with a greater number of entering freshmen and a larger percentage of them were falling into the remedial category. Of great concern was the fact that many of the students had no idea that they were remedial in any area. They had done reasonably well in

mathematics and English during high school. They would admit that they hadn't taken all the mathematics available to them but that was because they weren't interested in further mathematics at the time. They were confident that since they had graduated from high school that they could successfully pass a college level class. Have you ever tried to tactfully discuss a remediation problem with a high school graduate? These are students who have graduated from high school and have been told that they are capable of going on to the University!

During this same timeframe I had two children of my own who were preparing to enter college. Through observations of my two children, their academic performance and their ACT scores, I was able to obtain a much better perspective of the remedial student. While from a limited sample, I observed many students who chose a noncollege bound high school program, were in fact enrolling in college.

This was an era of rapid growth for the University. Student credit hour production was important and student recruitment was intensified. This is not to speak negatively to those efforts, but rather to indicate that this all occurred at the same time. As a result of the happenings, many of the faculty began voicing concerns regarding our remedial program. Concerns arose as to who had responsiblity for the remedial student. Should the University be involved in the teaching of remedial education? Should the high schools be forced to improve their level of instruction? This was a time of many "expert" opinions. Mathematics had gone from one remedial class to two. Proper

placement was confusing for those who didn't follow the guidelines closely. Many faculty, possibly rightly so, didn't understand what was happening, or why. Legislation was introduced into the Faculty Senate on several occassions to "direct" the remedial programs. Finally legislation was introduced relating to reading competency. This would have resulted in a third autonomous remedial program! The Faculty Senate recognized the need for reading competency, in fact it felt that reading skills may be more limiting than mathematics or English for the entering freshman. Faculty Senate passage of the remedial reading request would have surely received administative acceptance.

From the Faculty Senate debates, bigger questions and problems arose. Who was to establish the maximum number of courses that a student would have to successfully complete to show that he had mastered the remedial skill. New Mexico State University is an open admissions campus. Page one of the General Catalog states that any student with a C average, or an ACT of 19 will be admitted. Further, on page two we also have a provisional program for New Mexico residents. On page 10 of the same catalog we have a brief, but incomplete, discussion of the Remedial-Basic Skills Requirements. Only by reading through the course requirements, the schedule of classes and the directions provided by the departments offering the remedial courses can you obtain a complete picture of the remedial skills requirement. Hopefully as an advisor you had access to a specially prepared and complete set of instructions.

More importantly we had a need to reassess our University policies, to improve our catalog, handbook and distribution statements. New Mexico State University did not want to be involved in recruiting students which it couldn't handle in the education process. This meant taking a hard look at our responsibilities. Should we recruit students with low ACT scores? Should we alter our entrance standards? In a state where financial resources are limited, the cost of remedial programs must be evaluated. It was interesting to note from Dr. Roueche that 50 percent of the entering freshmen at the University of California were enrolled in remedial writing, and that the state of California was spending $66 million on remediation in the community colleges during 1980-1981.

It was apparent we had to look at a total program evaluation. This included everything from counseling and placement to retention and success rate of remedial programs. How beneficial were our remedial courses in interfacing with subsequent coursework taken by the student. When 13 percent of the 1983-84 freshmen entered New Mexico state University with an ACT composite of 10 or less and 38 percent had an ACT composite of less than 16, we needed to know this information.

In the spring of 1983 the Faculty Senate elected to establish an ad hoc committee of eight to pursue these activities. The committee has prepared a preliminary report and is now ready to develop final recommendations for the Faculty Senate.

COMMENTS ON KEYNOTE ADDRESS GIVEN BY DR. SUANNE D. ROUECHE, "BASIC SKILLS: DEALING WITH DEFICIENCIES"

by

Betty Harris

New Mexico State University

Member: Basic Skills Panel

From Betty Harris,
Member,
Faculty Senate ad hoc Committee on Basic Skills

COMMENTS on Keynote Address given by Dr. Suanne D. Roueche, "Basic Skills: Dealing With Deficiencies"

I have three initial reactions to Dr. Roueche's presentation --

1. I am frightened by the statistics she presents regarding incoming student capabilities.
2. I am disheartened by the magnitude and universality of the problem of the underprepared college student in the mid-80's.
3. I am reassured that our problem at NMSU is a shared one -- and that the issue <u>is</u> being faced.

I also have questions --

1. How do we apply Dr. Roueche's comments to what is going on here?
2. Do we have a responsibility - implied or stated - to the student who "pays his money" - does he just "take his chances?"

We have a few facts to deal with at NMSU:

1. We are a land-grant institution, with a fairly "open" admission policy.
2. Some students enter NMSU obviously unready for college-level work.
3. Some of these students are unprepared by virtue of poor high school preparation, either school-fault or learner-fault.
4. Some students are unmotivated for personal reasons.
5. All students come to college for something.

-----Do we owe these students anything if we recognize, in advance, a strong potential for failure in college level work?

Your Faculty Senate appointed an ad hoc committee to study basic skills, and this committee has been working for a year and a half. We have studied what is already in place here. We have studied what is available elsewhere. The committee has discussed at length what "seems right" in the NMSU setting. And the committee has identified what we think we <u>do</u> want:

1. a diagnostic workup of students "at risk",
2. special counseling and advising for these students,
3. a mandatory course sequence based on diagnosed needs,
4. co-ordinated, strong program leadership, and
5. efficient use of current courses and faculty.

We have also identified some things we <u>don't</u> want:

1. clumsy, expensive program administration, and
2. a "class" system which might develop if we adopted the "general college" concept.

The Committee's work is incomplete. There is still much to be done here <u>if</u> the faculty decides we should meet the challenge of the student deficient in Basic Skills.

THE BASIC SKILLS PROGRAM AT NEW MEXICO STATE UNIVERSITY

by

James Nordyke

New Mexico State University

Member: Basic Skills Panel

THE BASIC SKILLS PROGRAM AT NEW MEXICO STATE UNIVERSITY

The Character of the Present Basic Skills Program

It should be noted that NMSU has had a basic skills program at least since the late 1970s. Two subjects are included in it. These two are English and Mathematics. The rule at NMSU is that, before a student may take any upper-division courses, the student must have demonstrated competence in these two subjects.

In English, competence is demonstrated by having an ACT score of at least 26 in English or by taking English 111: Freshman Composition, a four-credit course, and getting at least a C in it. In order to qualify for English 111, some poorly prepared students are required to take English courses lower than 111: these are English 100N: Writing Tutorial and English 102N: Basic Writing. Each of these courses are two credits each, but the credits do not count toward a degree.

In mathematics, competence is demonstrated by an ACT score of 22 in mathematics or by taking with a C or better Mathematics 102N: Basic Algebra, a three-credit course whose credit does not count toward a degree. Very poorly prepared students may have to take another more basic course first: Mathematics 100N: Arithmetic and Basic Algebra, also a three-credit course which carries no credit toward a degree.

Judging the Basic Skills Program by Standard Criteria

Dr. Suanne Roueche has described 11 elements of a successful basic skills program for U.S. colleges and universities. A successful program is one that retains a high percentage of students.

One of these 11 elements is strong administrative support. Evidence of this support consists in part of statement in catalogs and other written materials which stress the university's commitment to assess and place students in basic skills and to assist the student to achieve basic skills. By such a criteria, NMSU does not seem to have strong administrative support for basic skills. The NMSU requirements regarding basic skills are tucked away in several obscure and scattered places in the catalog and appear as rules to be imposed on students, without any supporting rationale or stated commitment by the university to help students achieve the skills.

A second element is mandatory assessment and placement of all entering students. Students are expected to enroll in required skill courses before they enroll in any regular non-skill course which uses the skills. NMSU rules fail in meeting this criterion. All NMSU requires is that the basic skill competencies be established before taking any upper-division course. NMSU rules permit a student to take many lower-division courses without the student's having demonstrated competence in relevant basic skills.

A third element of success is structured courses. Basic skills courses must meet at specified times, be a semester in length, and be graded. NMSU seems to meet this criterion of success.

A fourth element of success is award of credit for basic skills courses. NMSU's program seems to meet this criterion.

A fifth element is flexible completion strategies: students may exit from a completed course before the end or after the end of the semester in which enrollment in the course first occurs, but within clearly specified time limits beyond that. NMSU seems to meet this criterion.

A sixth element is multiple learning systems: both class work and self-paced work are mingled. NMSU may meet this criterion, but perhaps not fully in self-paced mathematics courses.

A seventh element is volunteer instructors and advisors, who are given some special training to handle basic skills courses and students. I do not know how well NMSU fits this criterion. General over-all counseling of poorly prepared students seems weak at NMSU.

An eighth element is use of students as tutors in basic skills courses. NMSU uses student proctors in the mathematics program, but the university could probably go farther in this respect than it has.

A ninth element is monitoring of student behavior in basic skill courses. This seems to mean keeping track of student absences and of failures to turn in good assigned work and calling the student who is excessively absent or who does poor work. I am not sure how much of this is done in NMSU's program, but I suspect the actual amount is rather too little.

A tenth element is interconnection between basic skill courses and regular courses where the basic skills are used. How much of this is done at NMSU is not known to me, but probably it is little. It is done in the special tutorial course University 101, but this course is not part of the program in basic skills.

Program evaluation is the eleventh element. This means carrying out studies to determine the degree of retention of students in basic skills courses and retention of students in the university after the completion of basic skills courses. Studies of retention in basic skills courses are done at NMSU, but there are no studies of the extent to which basic skills courses increase the retention of students in the university.

Recommendations for Improvement in Basic Skills

The NMSU program in basic skills could be substantially improved in the following ways:

1. By requiring deficient students to take their basic skills courses first, upon entering the university and before taking most regular lower-division courses.

2. By requiring deficient students to demonstrate competence in reading.

3. By requiring deficient students to take a tutorial skills course in conjunction with at least one of several designated regular freshman courses.

4. By having a special advising and counseling program for all deficient students, a program coordinated across colleges so that it is university-wide.

5. By having a sufficient number of basic skills courses and specially designated regular courses so that deficient entering freshmen can have up to a full year of such work before taking a regular curriculum.

6. By designation of a university-wide staff person to coordinate the assessment, placement, and advisement of deficient students, to encourage students and faculty to make the basic skills program work better, and to study the effectiveness of the program and recommend changes in it.

Conclusion

It seems to me that at present New Mexico State University does not have an integrated, coherent, comprehensive program in basic skills. It has a set of courses in basic English and another in basic mathematics. Within themselves these two sets of courses probably are well run, for the most part. But there is no general university program of a systematic sort for guiding and assisting deficient entering students. Such a program is needed. Otherwise the university will continue to lose these students through high attrition rates, and it may, with its policy of open admissions, eventually even become liable to the accusation of having lured them here in the first place under false pretenses.

IS HIGHER EDUCATION AN EDUCATIONAL PROCESS OR SCREENING PROCESS?

by

Martin Blake

New Mexico State University

Is Higher Education an Educational Process or Screening Process?

By Martin Blake

In the past few years, the American people have become increasingly concerned about the issue of basic skills. This concern is reflected in the numerous magazine and newspaper articles on this topic which have appeared recently in the popular press. One common misconception is that the basic skill problem is a new one. This is definitely not the case. As early as 1828, the Yale Report called for an end to the admission of students with "defective preparation." Other sources also indicate that nineteenth century American colleges and universities admitted students considered to be far below acceptable college level standards (Brier, p. 2).

What is the nature of this problem that has afflicted our institutions of higher learning for almost 200 years? There are two elements to this problem, one a student element and the other a faculty element. To address the student element of the basic skills problem, we must first clarify what we mean by basic skills. In a progress report submitted to the NMSU Faculty Senate on May 1, 1984, the Ad Hoc Committee on Basic Skills characterized basic skills as the ability "to write, calculate, think, read with comprehension, and, generally, to operate effectively in the university." The problem is not that some students are totally lacking one or more of these skills. The problem is that they do not possess one or more of these skills to the degree assumed by professors in the university who teach freshman courses. Such assumptions about

entry skill levels are a necessity in the absence of proper data about entering students.

The student element of the basic skills problem is that students are individuals who have varying degrees of proficiency in what have been identified as the basic skills. When their proficiency in these areas is measured against the prerequisite skills assumed by professors in their courses, some of the students are judged to be insufficiently prepared or lacking the basic skills. Thus, one of the key elements of the basic skills problem is that professors' assumption about students' skill levels are not tested before the course but are judged after the fact. There is no diagnosis before entry into a course which could be used to determine if a student were improperly placed.

The faculty element of the basic skills problem is that many professors have not mastered the basic skills of teaching. They have not clearly defined the objectives in their courses or the prerequisite skills which students need to attain these objectives successfully. Most professors would be hard pressed to articulate the skills they implicitly assume that students in their courses possess. Many professors lack the ability to properly motivate students or effectively organize a lecture and have not mastered the basic classroom techniques of holding students' attention during a presentation. Lacking some of the basic teaching skills, they present their material to the students to the best of their ability and those students who do not succeed are viewed as lacking the basic skills.

When you get to the bottom line, the basic skills problem boils down to an educational organization which is insufficiently flexible to meet the needs of its clientele. If we were truly concerned about

educating students, we would concentrate our efforts more on diagnosing a student's current level of attainment, prescribing a course of study to raise the student's skills to some desired level and effectively carrying out this prescription. In reality, our institutions of higher education more closely resemble screening processes. A screening process evaluates students' abilities and elminates all those who fall below some given level. Through screening, we select a group of students who are sufficiently skilled and motivated that they can acquire knowledge in the manner in which we currently offer it. This approach is best typified by the often heard quote about "weeding out those who are not truly college material." Looking at some recent data, it seems as though we may be weeding a little heavy. To date, only 37 percent of the entering freshman class in 1976 have graduated from NMSU with baccalaureate degrees. The fact that we can effectively meet the needs of only four out of every ten students who turn to us should indicate that there is something drastically wrong with our system. In the past, our current failure rates were tolerated by society. However, with society's increasing need for skilled people, I doubt whether such failure rates will continue to be viewed as acceptable.

The first section of the 1984 Administrative Policies and Procedures of New Mexico State University deals with the missions, goals, and objectives of the university. It expresses a commitment to an open door policy and a belief that everyone has the right to those opportunities for personal growth which a broad education provides. It states that "the primary duty of the university is to educate. As the land grant institution of New Mexico, New Mexico State University is committed to serving the educational needs of a student body of various

ages, interests, and cultural backgrounds." However, there is a large divergence between our stated mission and the way in which we actually operate. When we employ screening tactics, we are expressing our basic disagreement with the open door policy. We do not stand ready to accommodate the varying skill levels that students of different ages, interests, and cultural backgrounds present us.

If we are to behave ethically, we either need to change our mission to meet our actions or change our actions to meet our mission. If we decide to change our mission, we must set admissions standards which give reasonable assurance that all those who meet these standards have a good chance of successfully completing a baccalaureate degree program. However, since we are a land grant university and have a history of having an open admissions policy, we may find it difficult to change our mission.

The other alternative is to change our actions to meet our mission. Since the basic skills problem contains both student and faculty elements, so must the solution. To address the student element of the basic skills problem, we must do a better job of evaluating students' skill levels when they enter, prescribing programs of study and carrying out the prescription.

We currently do almost no diagnostic testing of new students. The ACT test, which is required of all entering students, is not designed to diagnose learning difficulties. Although it may give some indication of a student's potential success in college, it does not permit the identification of basic skills deficiencies. All entering students are also given a mathematics placement examination. This test is designed to evaluate a student's level of attainment in this basic skills area.

There are no other tests which are currently administered to all entering freshmen to diagnose level of attainment in basic skills areas.

A university with an open door policy must be prepared to meet the needs of all students it admits. If a university has committed itself to a policy of open admissions, it incurs an obligation to conduct diagnostic testing for proper placement. Tests to diagnose a student's level of attainment in the basic skills areas are available. I recommend that we implement a comprehensive program of diagnostic testing for entering students if we are truly serious about educating them. We need to identify their level of attainment in the various basic skills areas and to identify areas in which serious deficiencies exist. We also need to identify the learning modes which are most effective for each of these individuals.

The next step is to prescribe a program of study to take the student from his current level of attainment to some desired skill level. This usually takes place through a student working with his advisor. In our current system, both the student and the advisor are handicapped in making this prescription. Typical college catalogs contain course descriptions so brief that they are unusable. In most cases, the student gets little idea of the skills and knowledges which can be obtained from a course by reading the course description. Prerequisites are stated in terms of courses rather than in terms of skills. Sometimes, there are hidden prerequisites where no prerequisites are listed in the course description, yet the teacher requires certain prerequisites on the first day of class. Freshman classes usually have no listed prerequisites. Yet, it is clear from listening to the professors who teach these freshman level courses that they expect the students to have certain skills.

Is it any wonder that students often end up in classes for which they are not adequately prepared, given the current state of affairs?

To help assure that students are properly placed, I recommend that we prepare detailed information about course content and the prerequisite skills necessary for success and get it into the hands of those who prescribe student programs. Although it may be too costly to include this detailed information in college bulletins sent to potential students for recruiting purposes, it is essential to make it available to advisors and others involved in student program planning. I also recommend that we institute workshops for academic advisors. These workshops would acquaint advisors with various techniques for using detailed diagnostic information in planning students' programs and with the resources currently available at the university which could be brought to bear on program planning .

Carrying out the prescription brings us to the faculty element of the basic skills problem. While obtaining their Ph.D.'s, most faculty are trained as researchers. Although some have experiences as teaching assistants, they are never really taught how to teach. When universities hire new Ph.D.'s after they have graduated, they neither check to see if this brand new teacher has the basic skills needed in teaching nor provide any training in these skills. Is it any wonder that many of our faculty are lacking some of the basic skills they need to effectively communicate the information which they have spent so long acquiring?

To correct this faculty element of the basic skills problem, universities need to invest more in their human capital. Most successful companies spend millions of dollars in training and upgrading the

skills of their labor force. Universities spend almost nothing. We need to institute an ongoing program to upgrade the teaching skills of faculty. A once-a-year effort to improve teaching such as the one in which we are involved today will simply not do the job. It is like working out in a gym once a year and expecting to see improvement. The way to improve teaching skills is no secret. The skills needed in teaching can be improved in the same way as any other physical skill; namely, through practice and good coaching.

You do not become a good golfer by listening to people talk about golf. You try a few swings with a good coach watching you. The coach makes suggestions on how to improve your swing and you attempt to make these adjustments. After some practice, the coach observes you again and makes further suggestions. This routine of observation, correction, and practice continues until you really have your swing grooved.

To improve our teaching skills, we need to embark on a similar routine of observation, correction, and practice. First, we need to get trained evaluators to observe our teaching. These evaluators would make suggestions about how we might improve, and we would try to incorporate these suggestions into our teaching style. After a period of practice, we would be evaluated again. This routine would need to be an ongoing process which was mandatory for all teachers.

This routine needs to be mandatory for several reasons. First, if it is mandatory, it is less threatening. Most people who enter teaching as a profession have at least a little hot dog in them and most are high achievers. When dealing with such people, egos often get in the way of admitting that help is needed and in seeking it out. If a program of upgrading teaching skills is mandatory, no one feels like they are being

picked on when an evaluator shows up in the classroom and no one has to ask for help. Help is provided for all.

Second, it must be mandatory to reach those with the greatest need. Often those who need it the most do not participate in voluntary teaching improvement efforts. It is human nature to avoid activities in areas where you are not proficient.

Finally, the upgrading of teaching skills needs to be mandatory to serve as a quality control for the educational service which we are selling. If we forget that the business we are in is selling an educational service and let the quality of that service slip, we are in serious trouble as an institution.

Specifically, I recommend that an outstanding teacher be identified in each department and that those individuals be provided training and release time for ongoing teaching improvement activities within their departments. I also recommend that the teaching improvement activities of these individuals be coordinated by a central organization, such as the Center for Educational Development and Evaluation, which would also provide the needed training and resource information for these individuals. These outstanding teachers involved in teaching improvement activities would have the advantages of 1) being familiar with the faculty in the department, 2) having familiarity with the subject matter of those whose teaching techniques they are trying to improve, 3) being accessible, since they are housed within the departments, and 4) having a recognized mastery of the basic teaching skills they are trying to develop in others.

What I am suggesting would involve a significant restructuring of our current institution. More resources would have to be devoted to diagnostic testing of new students. It is likely that additional courses

would be needed to provide developmental opportunities for those with basic skills deficiencies. It would take additional time and effort for teachers to more clearly describe the skills and knowledges that could be learned in their courses, and to clearly identify the prerequisite skills needed for success. With additional diagnostic information and additional detail in course descriptions, it would take longer for advisors to design student programs. Resources would need to be released in each department for teaching improvement activities.

Clearly, embarking on such a course of action would involve some costs. It is likely that resources would need to be realigned within the university. It may also be necessary to make a case to the legislature for additional resources. Faced with these problems, there is a strong urge to opt for the status quo. However, there are also significant benefits from this course of action. It would almost surely resolve some of our retention problems and would be a strong selling point in recruiting new students. Retention of a larger percentage of entering students would result in increased resources for the university, as would improved recruiting.

Making these changes would also result in a system which would better facilitate the entry of older students. Older students, like their younger counterparts, may have skill levels below those necessary for success in many college courses. A demonstrated ability to meet the needs of older students is essential if we are to tap this potentially large market.

Some might argue that it is not the business of colleges to provide remediation in the basic skills areas. They feel that this is more properly the job of the high schools. However, many students decide

that they would like to go to college very late in their high school careers. They have already omitted courses from their high school programs which would provide some of the basic skills needed in college. Others may take more time to gain mastery in the basic skills areas and high schools are very tightly locked into a four-year program. For both of these reasons, Universities need to be prepared to remediate the basic skills deficiencies of entering students for the foreseeable future.

The basic skills problem is one that is not likely to go away. Our entering students will continue to have varying levels of attainment in the basic skills areas. These skill levels will provide a poor fit with the minimum skill levels currently assumed in most of our entry level courses. This is apparent in the low percentage of entering students who successfully complete our degree programs. If we refuse to make the necessary changes and still accept the money of those who have very little chance of success, we are behaving unethically. Although it will require considerable effort, we must make the institutional changes needed to accommodate the varying skill levels of those who we currently define as our clientele.

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A MODEL FOR THE DEVELOPMENT OF CONTENT-AREA BASIC SKILLS COURSES AND ITS IMPLEMENTATION AT A LIBERAL ARTS COLLEGE

by

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Mark O. Farrell

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LaRoche College

A MODEL FOR THE DEVELOPMENT OF CONTENT-AREA BASIC SKILLS COURSES AND ITS IMPLEMENTATION AT A LIBERAL ARTS COLLEGE[1]

David E. Borrebach, Ph.D., Mark O. Farrell, Ph.D., and
Frederick Sproull, Ph.D.

La Roche College

La Roche College is a small (FTE ' 1000), regional liberal arts college in suburban Pittsburgh, PA. Over the past five years members of the faculty have systematically developed and pursued a model for the integration of basic skills development across the curriculum. This paper describes the model, including the techniques we have used, the results we have had, and what we have learned about the process.

The Beginning of the Basic Skills Program

The basic skills program developed as a direct result of faculty unrest concerning the unrefined nature of the the reading, writing, and computational skills of our students. Like many institutions, we had a group of students who were identified as being "at risk" in a college situation because of poor preparation (as shown by relatively low high school grades and low scholastic aptitude test scores). However, these students were few in number, and special "developmental education" program, (which was remedial in nature) had been put in place for them. But the problem with reading, writing, and computational skills

seemed to exist across the student population, with students who had respectable grade point averages and class rankings in high school. Our students seemed to think that studying meant reading over textbook material twice, and many had trouble reading textbook material in any case. A number of students could not fashion complete sentences or coherent paragraphs, and they did not know how to convert fractions to decimals or perform other fundamental computations.

Faculty response to this problem was varied. A few tried to address skills development directly in their courses, but most avoided discussion of mathematics or reading, and adopted varying strategies with regard to writing. Some faculty simply discontinued giving writing assignments (particularly in the introductory courses), arguing that student papers were incomprehensible. Another response, which was somewhat more common, was to stress (and grade) only on the content-related elements of a student's written work. If a student wrote in an ungrammatical fashion with numerous misspellings, but had the content correct, the student received the same grade as someone with grammatically correct work and the same understanding of content. Students were thus neither penalized nor rewarded for their writing skills. And a third response was to make corrections to a student's work, and perhaps reduce a grade in response to grammatical and spelling errors, but not to otherwise address writing in the classroom, or to require that poorly written work be resubmitted.

Development of the Basic Skills Model

In the late 1970's the "basic skills problem" led us, as an institution, to develop a model to deal with the problem. Our model had three primary components: (1) the basic skills program would be developed by content-area faculty and integrated into content-area courses; (2) the program would be directed at freshmen during the first year, sophomores the next, and juniors and seniors during the third year; and (3) the program would stress the active involvement of both faculty and students. Faculty would deliberately structure modules for their courses which would in turn require the active involvement of students.

We sought and found funding for the project as part of a Title-III SDIP grant. The basic skills portion of these funds provided primarily for the administrative support of the program, for consultants, and for summer stipends for a group of faculty. While outside funding is not necessary, it obviously reduces the burden on the institution. In La Roche's situation, it made the program possible.

The Basic Skills Workshops

The involvement of content-area faculty in the basic skills program requires a time commitment few can make while teaching a normal course load during the regular semester. We therefore decided to hold a series of summer workshops for faculty during which the basic skills activities would take place. All faculty at the institution were given the opportunity to nominate themselves into the program.

The First Summer Workshop. Nine individuals were selected for the first workshop, which ran for six hours a day for six weeks. During this workshop the participants had three basic goals. The first was to discuss and define what basic skills would mean at La Roche College; the second was to learn about a number of techniques that could help students develop and enhance competency in basic skills; and the third was to apply the techniques in one or more modules that would subsequently be used in specific freshman-level courses.

Defining basic skills. We defined basic skills as the generalizable, fundamental skills necessary for success in college and in the world of work subsequent to college. These are skills that are largely independent of content, but which are necessary in any content area. We came to agree that basic skills are relative to a student's level in college--basic skills for a freshman go beyond what would be learned in the twelfth grade; basic skills for a college senior refine and extend skills that have been previously acquired.

The biggest problem that we have encountered with this definition is in the semantics. Many faculty equate basic skills with remedial skills; at La Roche we simply reiterated our definition until the entire faculty understood that remedial skills and basic skills were not the same. We also had some semantic trouble with the notion of upper-division basic skills; some faculty argue that anything done at the upper division is necessarily an advanced skill. The general response to this argument at La Roche is to defuse it by focusing on the kinds of activities prescribed in the upper division classroom.

Basic Skills in Content-Area Courses. We have occasionally heard it stated that the only thing that belongs in a content-area classroom is the specific content in the course, as if articulate writing or effective reading are unrelated to the course at hand. The faculty at the summer workshops spent a substantial amount of time discussing this issue, but the point eventually became moot for two reasons. One was the simple fact that as we thought about incorporating basic skills in our classrooms most of us found a technique which integrated basic skills into the content area so well that it would have been adopted even in the absence of a formal basic skills program. The second, related reason is that after the workshop faculty tried the basic skills modules during the first year of classes they worked so well that most of us began adapting the modules for use in number of our courses. As basic skills came to be integrated throughout the La Roche curriculum the argument against their incorporation in content area courses became increasingly infrequent.

The second and third workshops. During workshops held the second and third years participants worked on developing modules for sophomore, and then for junior and senior level courses. As in the first summer we used the help of consultants; we found that those who focused on specific "nuts and bolts" strategies for building basic skills competencies were most effective. By the end of the third summer workshop a sequence of courses was in place that provided opportunities for basic skill development across the curriculum.

Examples of Modules

What follow here are specific examples of how a basic skills component can be incorporated in content-area courses.

Introductory Psychology. One of the modules inserted into the Introductory Psychology class dealt with reading original published articles. After reading the article students are given a three-pronged writing assignment. They are first asked to summarize the article (in less than 150 words), then to discuss a specific aspect of the article in relation to the class discussion and text material, and subsequently to offer their own reasoned opinion on a controversial matter contained within the article. Students write a draft of their paper, and bring it to class for comments by fellow students and for a general classroom discussion of the topics associated with the paper. They then produce a final copy which is handed in during the following class period for grading on content, spelling, and grammar. While not all students avail themselves of the opportunity to improve their written work, most do, and there has been a clear improvement in the quality of written work produced.

General Biology. General Biology I and II is a two semester introductory course taken predominately by future biology majors. Specific attention was given to the problem of developing reading, writing, and mathematical skills without a significant dilution of content. The answer to this problem was to develop skills in different components of the course. The classroom component of the course is especially good for the development of reading skills, while the laboratory associated with the course

is well suited for the development of writing and mathematical skills.

In order to develop reading skills without content-area dilution certain procedural changes were put into effect. The text used in the course took on increased importance. Lectures which previously ran parallel to reading assignments were more explicitly related to the reading assignments. At the time a reading assignment was given the instructor tried to anticipate possible areas of difficulty, and previewed them for students. During the next lecture portions of the reading assignment were referred to directly, particularly graphs and difficult paragraphs. Outside material and examples were still incorporated, of course, but the text and lecture presentation came to form a more cohesive whole.

In the laboratory the written report took on added importance when the basic skill module was inserted. Prior to the addition of the module primary emphasis was on grading content; subsequently the grade also reflected grammar, spelling, and the clarity of expression in the procedural parts of the report. This added emphasis was developmental, rather than punitive, in nature. Otherwise, only the academically strong students would survive, which is contrary to the philosophical underpinnings of the basic skills approach. To provide time and opportunity for academic development, reports were collected and returned on a weekly basis. Reports which were deficient on grammar and spelling could be rewritten and resubmitted for grading. Also, a weighted grading system was used, with later reports given a higher weight than earlier ones to promote a developmental ap-

proach.

Chemistry. Since 1980 a concerted effort has been made to integrate skill development components into key courses in chemistry at La Roche College. Three chemistry courses in particular have been targeted: General Chemistry I, Organic Chemistry I, and the Senior Seminar. Each has a unique aspect to its skill component based on the nature of the course and the range of students taking the course.

General Chemistry I is the introductory chemistry course and is taken by all natural science majors. This course is intended to present key concepts needed for upper division courses in biology, chemistry, and physics, and also to provide a general body of knowledge about what is often called inorganic chemistry. Because there is often a wide range of abilities in this course, a considerable amount of time is devoted to building skills in mathematics and laboratory technique. For this reason the skill development component was focused entirely on the laboratory portion of the course where the instructor can better deal with individual needs. The program uses the laboratory experience to build reading, writing, and mathematical skills. The laboratory report becomes the vehicle for skill assessment and consists of three portions. The first section is a "pre-lab" section in which the student must state the purpose of the experiment, list all equipment needed in order of use, and summarize the key procedures. This helps develop reading comprehension skills and writing skills. The second section is an "in-lab" portion which consists of recording observations and data on a report sheet.

The third section is a "post-lab" section in which the student completes all calculations and writes a summary of what he or she learned. This is quite challenging for the students at first, but after several labs they learn what is expected and become better able to summarize their learning. Each lab report is graded on a ten-point scale; each point represents a desired skill. These points are:

1) Correct calculations;
2) Correct use of significant figures;
3) Proper selection of formulas and equations;
4) Correct observations;
5) Accuracy and precision of measurement;
6) Correct spelling;
7) Correct sentence structure;
8) Correct paragraph structure;
9) Accurate summarization of the procedure; and
10) A coherent, cohesive statement of learning.

Each report is graded for each of the ten points. Specific written comments are made and often individual discussions are held. The students keep all of their reports in a folder and progress is checked each week. Special emphasis is given to skills which repeatedly show deficiencies, and often remedial work is advised in the college's Learning Center. These lab reports provide a weekly evaluation of skill development and also allow the instructor to profile a student's strengths and weaknesses. As it has evolved, the reports are good predictors of final course grades: students who perform well on the reports from the start generally earn an A or B overall; those who have low scores initially but raise them over the semester usually

earn B grades, and those who start low and stay low most typically earn a D or F in the course.

The basic skills module for Organic Chemistry was developed during the faculty workshop in the second summer of the program. Organic chemistry is an upper division course taken by biology, chemistry, and medical technology majors. Large amounts of complex material must be mastered in this course, including 550 pages of difficult textbook material in 14 weeks. The skill development component thus concentrates on reading skills. On the first day of the course a Cloze exercise is performed to assess the students' ability to comprehend the text (see Vacca, 1981, pp. 270-273). All students are then instructed in two learning strategies, and those who score below a 40% cut-off score are also advised to seek additional help at the Learning Center. The first of the two learning strategies discussed in class is the SQ3R prereading/study strategy (see Robinson, 1970). The second strategy involves the use of structured overviews, in which key vocabulary terms are arranged in a hierarchical fashion (see Vacca, 1981). Initially students are given structured overviews with all key terms properly arranged. After the first four weeks certain key words are omitted, which requires the students to discover the missing words. Eventually no overviews are handed out and students are encouraged to do their own. The purpose of both the SQ3R and the structured overview is to teach students to help themselves.

The third chemistry course targeted for a basic skills component was the senior seminar, which must be taken by all chemistry majors. The major goals of the course are to have

students read professional literature, write a review paper of beginning professional competency, and design an experiment. A technique used to carry out the first goal is to have students critically read, and then "translate" technical papers into their own words. For the review paper and the experimental design, the student consults with the instructor and develops an outline. Drafts are then written in a section-by-section manner. Each draft is submitted to the instructor, who suggests revisions and returns it to the student. Most students produce two drafts prior to reaching the final copy; some occassionally require more. The developmental approach ensures that each student masters the skills necessary for professional-level work.

The sum total of these courses is a comprehensive effort to build and maintain basic skills in our science students which extends over the career of a chemistry major.

The Integration of Basic Skills Across the Curriculum

Two primary forces worked to help spread basic skills courses throughout the La Roche curriculum. The first of these was the incorporation of modules taught by basic skills workshop faculty in courses other than those originally designated as basic skills courses; this effect was referred to above. The second force was the curriculum revision process in which La Roche was involved at the time. Two years after the first basic skills workshop the faculty as a whole voted to establish a structure for basic skills development across the curriculum. One component required all students to take a two-semester sequence of English composition courses, and a college-level mathe-

matics course. At the same time basic skills courses were formally established as a part of the curriculum. Faculty in all academic divisions were required to identify a lower and an upper-level course as a course in which basic skills would be explicitly addressed. Students were not required to take any specified number of basic skills courses, the thought being that the sheer prevalence of basic skills courses across the curriculum would be sufficient. The results of this revision are still out, but faculty seem to agree that seniors seem more prepared now, while entering freshman still seem to have the same needs as our students did prior to the basic skills program. A newly established committee is now assessing the current basic skills courses and is developing guidelines for the formal evaluation of their success.

Recommendations

The experience of La Roche College with its basic skills program demonstrates that content area faculty can make a difference in their students' development of mathematical, written, and reading skills. While any curriculum revision involves both costs and benefits, those involved in the program agree that the benefits are substantial. The greatest cost comes not from the time spent in the classroom, but the time faculty spend outside the class in the evaluation of student work. The additional work is most noticable with the implementation of an entirely new assignment. If a basic skills module is integrated into an existing assignment (such as the writing of a paper), there is little additional time needed to attend to basic skills issues.

The biggest requirement in this case is simply to be intentional about the activity.

Another point we would like to stress was the benefit of having content-area faculty nominate themselves into the program. A core of interested faculty got the program rolling, and it was the interest and experience of the core group that facilitated the dissemination of basic skill courses across the curriculum.

The use of stipends for participation in summer workshops worked well; we have used this technique subsequently for curriculum revisions outside the basic skills area. Basic skills modules were developed under more relaxed circumstances than is possible during the academic year; there was more time to think and talk ideas over. Faculty benefitted too from the mutual sharing of ideas and sense of team spirit that developed during the workshops.

The basic skills program was conceived and developed by faculty. Workshop faculty had the opportunity to explore and discuss various possible structures, and to arrive at one which "fit" La Roche. Leadership came largely from within the faculty, and that leadership was based predominately on the personal power of knowledge and ideas rather than power derived from an officially appointed position. Our program clearly benefitted from this arrangement.

Our use of outside consultants had more checkered results. One of the distinguishing qualitities of a consultant is that individual's ability to extrapolate general educational principles to specific individual institutional needs and problems.

Note

1. We wish to give particular thanks to Dr. Mary Stuart, our Vice-President for Academic Affairs, Dr. William Hahn, now the Vice-President for Student Affairs, but previously the Director of the Title-III program and coordinator of the summer basic skills workshops, Dr. Kathleen Angel, C.D.P., currently on leave of absence from the college, who played a substantial role in the initial formulation of the basic skills model, and who served as the Basic Skills Coordinator during the first years of the project, and to our colleagues in the basic skills workshops.

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All of our consultants were not equally adept at this, and a number did not take the time to familiarize themselves with the workings and philosophy of the institution. The less effective consultants spent a relatively large amount of time lecturing to us on material which was not particularly relevant to our college or to our goal of fostering basic skill development. The better consultants seemed to have a better idea of our mission and were more able to help us acquire knowledge and skills. The same theme which we have come to emphasize when teaching students basic skills--give students the opportunity to produce--was applied to the workshop by effective consultants. The workshop faculty thus responded best when asked to do such things as construct their own hierarchical outline of a chapter, or to apply one of a set of writing strategies to their class material.

In any case, consultants came to play a less important role later in the workshops. The faculty developed and articulated a definition of what basic skills would be at La Roche, which reduced the need for outside stimulus. Also, we came to rely on each other's skills, having found that activities and ideas suggested by our own faculty easily had the merit of those suggested by consultants. Our own faculty also had the distinct advantage of knowing our situtation and our student body intimately.

In the future we would recommend that consultants be used, but somewhat sparingly. An outside consultant would be useful in facilitating the initial discussion of what basic skills involves, and consultants with specific skills can help provide exercises for content-classroom use.

LITERACY AND WRITING: MAKING THE 'CONNECTION'

by

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Literacy and Writing: Making "The Connection"

For those of us who teach basic English or any freshman composition course for that matter, statistics pointing to the low level of illiteracy in the United States, less than 1% of the total population, are far from comforting. The type of illiteracy quantified here is the most basic kind--the inability to read and write. This is obviously not the type of illiteracy we have in mind when in moments of exasperation, amid the piles of freshman papers we are grading, we are sometimes moved to lament the "illiteracy" of our students.

Critics today are divided on the definition of the term literacy. It is the sort of word that can easily be manipulated to accommodate the statistics, and the statistics can be merely interesting or disconcerting or frightening depending on how they translate into human beings that actually affect our daily lives. For example, the estimate most often used is that one out of every five adult Americans, approximately 23 million Americans, is functionally illiterate; i.e., these people lack the reading and writing skills to perform basic tasks in our society, such as read signs or fill out the ubiquitous forms which seem to have become a part of our lives. Twenty-three million is a figure that can be staggering. After all, who among us would not be happy to win one million

dollars in a lottery? On the other hand, twenty-three million is a figure that becomes meaningless when compared to our country's national debt. Wouldn't President Reagan be pleased if he could chop 1.65 trillion down to 23 million dollars? But when we talk about literacy, we are not talking about dollars; we are talking about people. Some of the strongest advocates for literacy campaigns like to point out the dollar-and-cents effect of illiteracy; for example, it is estimated that 7 billion dollars is spent yearly to keep hundreds of thousands of illiterate prisoners in United States jails. At least another 6 billion dollars is spent yearly in the funding of welfare programs and in loss of productivity.[1] Still, unfulfilled or damaged lives do not translate into numbers very well.

So, long having been suspicious of the statistics and the scholarly articles and public debates on terms such as raw literacy, functional literacy, semi-literacy, pre-literacy, and even super literacy and yet believing that I, as a teacher of basic English, have something to do with all these statistics and terms, I turned to my students for answers and help. What this paper explores is what they told me and also what I learned from a book entitled On Literacy: The Politics of the Word from Homer to the Age of Rock written by Robert Pattison and published in 1982. Both my students and Pattison forced me

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1. Jonathan Kozol, Prisoners of Silence: Breaking the Bonds of Adult Illiteracy in the United States (New York: Continuum, 1980), pp. 2-5. This book by Kozol along with his Children of the Revolution: A Yankee Teacher in the Cuban Schools (New York: Delacorte Press, 1978) examines the connection between literacy and social policy.

to look at the troublesome word literacy and also at the elusive process of writing and examine more carefully the connection I believe to exist between the two.

First, a look at what my students have to say. In spring, 1984, I asked the students of my basic English classes at the University of Houston-Downtown, some forty-two students, to respond to the question "What is literacy?" Here are some of their undoctored replies:

1. The word literacy could have several different meanings. Of the several different meanings I personally have no idea of what it means. But I will try my best to define it for you. In my opinion, literacy deals with the process of learning.

2. I think literarcy has something to do with literature. Literarcy probably has something to do with some type of grammer, or maybe some form of literature. Literarcy would probably even deal with writing in a particular way.

3. I have always felt a little literate about things I do in life. So I think that literacy plays a major role in my life.

4. What is literacy I think that literacy has something to do with liter. For example Houstons literacy is growing more everyday. And will get worst in the oncoming years.

5. When in society people have sense of respect love and care for other I would call this as a leterate society. On the other hand, even if people are graduate from Cambridge University and if their acts are not like literate people then I would call them illeterate person or illitracy.

6. What is literacy? Literacy is the ability to read and write. There are standards that determine your literacy level. There is a movement in the country today to improve the level of the literacy of children in our schools.

When during the next class period, I asked the same question of these students, the responses remained relatively unchanged, suggesting that those who did not understand the term the previous class were not motivated to find out what literacy meant since their second response basically repeated their first. An interesting postscript to this exercise is the fact that the students providing responses 1, 2, 3, and 6 all passed English 1300 (Basic English) at the end of the semester. The writers of the fourth and fifth responses withdrew from the course before semester's end because of failing grades. For me, this pass/fail rate raises serious questions about the function of basic writing classes and their connection with the student's achievement of a certain level of literacy.

Surveying these same students, I decided to examine their attitudes toward writing and reading, commonly regarded as the two basic components that define one's standard of literacy. Not surprisingly, one student out of over forty enjoyed writing. The others rated it as an activity slightly less enjoyable than having their teeth pulled. When questioned about their dislike of writing, the students invariably replied that writing was too hard and that they saw little practical benefit for it in their future lives. This response was strongly held, in particular, by students in the technological disciplines. When asked to define the term <u>writer</u>, these students usually spoke of a professional writer, someone who writes well and who gets paid for her product. They also tended to see a writer as someone

who can with ease translate her thoughts onto paper, and because these students lacked that ease, they saw its absence as one more indication that they were not writers. There is probably not a single English teacher alive who has not heard at least one of her students say, "I can talk a whole lot better than I write." Most of the time, this is not really true. The student neither speaks nor writes well, but without the "evidence" of the written word, the student is less easily made aware of her failed attempts at communication.

In this same survey, I also questioned my students as to their reading habits. The material most of them read was newspapers and magazines. The reason they most often read was for information. They continued to read a piece if it was interesting; they stopped reading if it was boring. When pressed as to what made something interesting, they cited qualities such as action, suspense, excitement, adventure--qualities not normally associated with informational reading--and a basic curiosity about the subject matter to begin with. The quality that most often made a piece boring to them was the difficulty of the writer's style or his choice of words. Students were unwilling to continue to read what was not immediately comprehensible to them. The catch-22 here is that most college-level reading is not readily comprehensible to a basic English student.

One of the most troubling responses to my survey came in answer to my question "What do you see as the role of reading and writing in your life?" Several left the answer space blank, and when I later followed up with questions as to why,

each student replied that she had not understood the question. Other responses were also discouraging. Some students acknowledged that the role was one of importance but did not elaborate further. Other students spoke in terms of having to read and write class assignments in college and prepare reports of various kinds in anticipated careers. Both reading and writing were consistently seen in terms of practicality by the student, which may explain, at least in part, why these same students do not want to take courses in literature even while they can see some value in "writing" courses. Literature, after all, does not tell them how to be successful in life or how to get a better job, and for many basic students these are the prime reasons behind their going to college, sometimes the only reasons.

If reading and writing skills are the primary means of assessing literacy, then it makes sense that not only performance in these areas but also attitude toward developing competency in performance is important when we talk about literacy. The key word here is attitude. What defeats many basic English students before they enter the classroom is their attitude toward the job that awaits them. But it is not just their attitude that defeats them; it is ours, the one that we bring to the teaching of these students whose previous academic failures are, for the most part, failures we as students never suffered.

Robert Pattison's book On Literacy was useful for me in challenging some of my attitudes and in getting me to recon-

sider what literacy is and what my role as a writing instructor has to do with it. Pattison takes what many would call a radical stance. He dismisses a number of works on literacy as the "same old whine," which he sees characterized by faith in four axioms:

1. Literacy is equivalent to skill in reading and writing.

2. Individuals who are literate by this standard are more cultured and civilized than those who are not.

3. The skills of reading and writing should be propagated among poor people as a first step in their economic and social development.

4. The skills of reading and writing should be preserved and expanded at home as a chief means of protecting democracy, moral values, rational thought, and all we hold dear.[2]

In his book, Pattison amends each of these premises. His first amendment is particularly important because it sets forth a new definition of literacy, which Pattison sees as "foremost consciousness of the problems posed by language, and secondarily skill in the technologies, such as rhetoric and writing."[3] The people that Pattison takes to task are the John Simons, Edwin Newmans, and William Safires of our culture whom he sees arguing needlessly over word usage, "splitting hairs," and preventing, whether consciously or unconsciously, the natural evolution of the language. The extended example that Pattison gives of

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2. Robert Pattison, On Literacy: The Politics of the Word from Homer to the Age of Rock (New York: Oxford University Press, 1982), p. vi.

3. Pattison, p. vi.

such "counter-evolution" on our college campuses involves a professor at a Midwestern university who is preoccupied with the abuse of the English language as demonstrated in misuse of the word hopefully. I am not sure what this professor or Safire or Newman or Simon would make of my students' writing. Perhaps they would respond to it with horror. I do not have time to trouble over these "niceties of language," as Pattison puts it, because when a student writes of "french prevenshunal funiture" instead of French provincial furniture or when she writes of "radio tires" instead of radial tires, these are more than mere slips in language. They are indicative of far more serious problems in the student's writing and her understanding and usage of language.

However, what Pattison attacks, and I think rightly so, is the "cult of correct usage," that emphasis upon form frequently at the expense of substance that prevents us from dealing with the more important problems that confront us: while some can't read or write, others can't speak English, and few can think.[4] A brief look at recent "basic writing" texts shows books that stress grammar and sometimes paragraph development. Do these books work for my students, 99% of whom are minority students, usually of Hispanic or Black backgrounds? The answer is a resounding NO. And the attempt of textbook writers to recognize minority interests by incorporating Hispanic or Black names into grammar exercises does not help the situation. Eight-word sentences that read "José and Maria

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4. Pattison, p. 157.

(go, goes) to the film together" do not suddenly provoke the interest of my Hispanic students in correcting long-standing problems in subject/verb disagreement. What most basic writing texts do is alienate their target audience, most of whom have managed throughout twelve years or more of schooling to resist learning what these texts are once again trying to teach them. Why the resistance? One good reason is that most of these students fail to see the utility of learning the difference between a gerund and a participial phrase at age eleven or sixteen or twenty. Another good reason is that grammar drills reinforce the students' sense of inadequacy when it comes to writing. Students become so intimidated by the threat of doing something wrong grammatically that their thoughts and their pens freeze in mid-sentence. I am not saying that grammar should be ignored in basic writing classes, but rather that it needs to take a definitely subordinate role to the process of writing itself, which is more than an exercise in putting the commas in the right place. It always amazes me how many students are worried about commas. My experience shows me that while grammar exercises and drills can help improve the grammar of some students on subsequent grammar tests, these exercises and drills do not, in and of themselves, make students better writers or more literate writers. Yet each year, major publishing houses produce new texts for basic writers, which, in their prescriptive approach, continue to fail our students' needs. What we need are not more textbooks, but a different attitude and

approach to the teaching of basic English.

Near the end of his book, Pattison makes three general suggestions about teaching English that I think are worth consideration in the revamping of our freshman English programs. First, he suggests that standard English be taught as a "practical tool of social advantage." What Pattison objects to is the argument advanced by some that "the survival of American civilization rests upon the univeral dissemination of reading and writing."[5] For example, a recent article in the Houston Post was captioned "Report: Illiteracy a menace to nation." The article went on to quote historian Daniel Boorstin, head of the Library of Congress, who in a report to Congress stated that the best way to observe the 200th anniversary of the Constitution in 1989 would be to make the country a nation of readers and to "justify the faith that a free people can provide themselves and their children with the knowledge which will keep them free!"[6] Pattison's point is that mechnaical literacy does not ensure the development of a critical mind nor a citizen's making the right choices to maintain a democracy. What mechanical literacy does promote is the efficient transfer of information in what has become an information-oriented society. My students respond most positively to the demands of learning standard English not when

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5. Pattison, p. 172.

6. "Report: Illiteracy a menace to nation," Houston Post, 15 Dec. 1984, sect. 1, p. 3.

they are told that somehow this knowledge helps promote democracy, but when they understand that their ability to use standard English affects their worth in the market place. When they are made to see that prospective employers do, in fact, make value judgments on their job aptitude based upon their ability to correctly fill out an employment application form, these students become more serious about their English. What basic writing students need is to hear from someone other than English teachers that standard English is important.

Pattison's second suggestion for the teaching of standard English is that it should be treated as a second language, and not as the correct form of the language that the student already writes and speaks. I remember counseling a Black student last semester who was having tremendous problems in writing about literature. She listened patiently to my critique of her work and then smiled and said that she was going to have to take the advice of her friend who had told her basically to ignore her own writing voice and write the way white people talked because that's what they wanted and expected. She saw standard English much the same way that I might see my Sunday best, something to be taken out and used as the occasion demanded, but something which was not a daily part of her life nor which she was necessarily comfortable with. She recognized the difference between the way she spoke and wrote and the way I did, but to her the difference translated into inequality with one type of English, standard English, maintaining its ascendancy because it is the language of the prevailing middle

class.

Similarly, midway through last semester in one of my basic English classes, as I was explaining subject/verb agreement, stressing the "s" ending in third person singular present tense, a hand shot up in the back of the room, and a student innocently asked, "Are you sure that the answer is 'she walks' and not 'she walk?' It just don't sound right." And, of course, to her it didn't sound right. It was a speech pattern foreign to her own.

The resolution "The Students' Right to Their Own Language," passed in 1974 at the national convention of the Conference on College Composition and Communication, calls among other things for teachers to respect the language spoken by minority youth in their homes and neighborhoods. The third sentence of the resolution says, "The claim that any one dialect is unacceptable amounts to an attempt of one social group to exert its dominance over another." Spoken/written variations and other language awareness are written into the goals of the current UH-Downtown freshman English program, but even as I try to meet these goals, both my students and I recognize that my respect for their dialect cannot guarantee the same respect for it in the business and scientific communities, and so we work together to achieve still another stated goal of the UH-Downtown writing program, and that is attainment of the "ability to use language which observes the conventions of standard written English."

However, the problems of minority students attempting to

write standard English are further complicated by the fact that many of them do not speak it and are literally translating from their dialect as they write. But they are translating into a language that they don't totally understand, a language which is for them a pastiche of what they have heard from their teachers over the years and from the media, and so post-Watergate gobbledygook is peppered in among the most basic kinds of grammar and spelling errors. Vocabulary words memorized from lists in high school English classes are introduced into sentences where they are laughably inappropriate; e.g., "We went to a party Saturday nite. Their was great music and food. All in all, we had s supercilious time!" These students are striving for an effect, concentrating on form rather than substance, which brings me to Pattison's third and final suggestion for the teaching of English.

Pattison believes that "students should be encouraged to think, speak, and write according to their own conceptions of literacy." This may sound like a call to chaos, but what Pattison wants to stress is the student's development of her own writing voice. He adds these caveats: the student must understand

> that society at large will not accept ideas written in this form; that the speech and writing must be clear and comprehensible according to its own standards; that the student should develop his awareness of the uses of language as a result of his own writing.[7]

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7. Pattison, p. 168.

You might question exactly what, with all these warnings, the student accomplishes by following Pattison's suggestion.

But consider the purpose of writing. It should be first an act of discovery and then an act of communication; the writer must discover what it is she wants to say before she can say it. Joan Didion in her essay "Why I Write" states that she writes in order to know what she thinks, but for most of our students writing is a classroom activity with complex rules that they do not clearly understand, yet somehow struggle to follow. They write primarily to please that strange breed of human beings known as English teachers. There is no personal discovery for these students, only further alienation from what Pattison calls "the chief vehicle of self-knowledge and social order--language." Remember that Pattison defines literacy as first and foremost "consciousness of the problems posed by language and secondarily skill in the technologies such as rhetoric and writing." If we as English teachers concentrate on the technologies, how do we help make our students truly literate? Kozol in his book Prisoners of Silence suggests that functional literacy goes beyond the ability "to read, write, and comprehend signs, instructions, labels, orders." It also includes the ability to question the legitimacy of all such writing and to participate in and, when necessary, to transform any system or society that works against our interests.[8]

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8. Kozol, p. 55.

Mindless adherence to half-understood rules is a dead end for our students and utimately for ourselves.

A study published in 1977 by the Department of Health, Education, and Welfare had this to say about the literacy of seventeen-year-olds in this country ten years ago: 90% could understand a job ad in the newspaper; 85% could read a map; an impressive 75% could fathom the phone company's instructions for dialing long-distance. But when asked to write an essay based on a situation shown in a picture, the students'average paper was 137 words long, their average word four letters long. The Department's study concluded that these students could not write well in "an unstructured, non-directive situation,"[9] which, it seems, is the same as saying that they cannot think for themselves.

Changing our attitudes and approach as teachers of English is not a cure-all for our students' lack of critical thought. But if we refuse to get bogged down in the mechanics of writing and instead work on the assumption that our students do have things to say that are worth hearing, we do them the service of withholding our condescension and helping them discover through writing their worth as "thinking" members of a truly literate society.

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9. Pattison, pp. 175-76.

CRITICAL READING DEFICIENCY - CAUSE, SCOPE, REMEDIATION

by

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Critical Reading Deficiency --
Cause, Scope, Remediation

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What is encompassed by critical reading at the university level? One way to define critical reading is by contrast with functional reading. Persons can read functionally if they can extract information from a text to achieve goals that they themselves have established. Whereas functional reading responds to self set goals, critical reading is directed toward the resolution of problems established by others. Thus some persons might possess the functional skills needed to read a magazine effortlesses when they set the limits of this task. However, when someone other than those readers establishes the criteria for successful reading, this second task, a critical reading task, could be inaccessible. Additionally, functional reading skills are restricted to genres of materials with which readers are experienced. Critical reading assumes that persons can transfer skills to specialized texts outside of familiar genres.

Quite often college applicants view themselves as competent readers. They read regularly from predictable types of texts and extract successfully the information for which they are searching.

It is with alarm and confusion that examinees react to failing scores on the verbal portions of admission tests such as the Scholastic Aptitude Test or the American College Testing Program Assessment. Such tests require students to respond to a full range of extremely restricted tasks with passages that are unlike those they confront normally.

During the past two decades, the critical reading skills of highschool students, to the extent that these were reflected in the scores on verbal portions of admission tests, have declined predictably. To some extent this decline mirrors changing attitudes toward standardized tests as a result of the reduced impact that the tests have on decisions about admission to college. Additionally, the demographic porfile of persons who take admission tests has changed. Some observers have pointed out that the accessibility of information through nonprinted media is responsible for declining verbal scores. These arguments are interesting and probably correct as sociological explanations of why test scores have declined. However, a question still remains as to the academic impact of deficient reading scores. Do persons who score in the lower percentiles on critical reading tests constitute a homogeneous group that cannot use texts to meet the requirements of college courses?

To answer this question, a sample of 153 students in basic skills reading courses at New Mexico State University was tested. The elective courses were designed to improve the reading skills of the enrollees. The sample comprised students from six colleges at the

University (Table 1). Forty-nine percent of the persons described their ethnicity as American Spanish. Thirty-nine percent described themselves as American not affiliated with a minority group. The remainder of the sample members included small numbers of students from minority groups other than Spanish American. The Nelson-Denny Reading Test was administered. Reported correlations between this test and the verbal portion of the American College Testing Program Assessment, the test required for all students admitted to New Mexico State University, have ranged from .57 to .65. Scores on the Nelson-Denny Reading Test were converted into grade equivalents (Table 2). Seventy-nine percent of the persons in the sample earned scores below that which would be the equivalent earned by an entering college student. Eight students earned scores that would be appropriate for elementary students in the fifth grade or below.

Upon first examination, these data seem extremely distressing. However, all persons who receive the scores equivalent to those of highschool students, or even those equivalent to elementary school students, are not a homogeneous group of equally disabled readers. Among those persons who score deficiently on a critical reading test may be persons at three distinct levels of development. Figure 1 represents a critical reading stage and two stages of precritical reading. Persons at any of these stages could fail a critical reading test. The etiologies of those failures would be distinct for different cases and the appropriate response could be correspondingly divergent.

TABLE 1

College Affiliations of Students in Sample

College	Number of Students	Percentage of Students
Agriculture	15	10%
Arts & Sciences	31	20%
Business	23	15%
Human & Comm Serv	41	26%
Education	11	8%
Engineering	32	21%
Total	153	100%

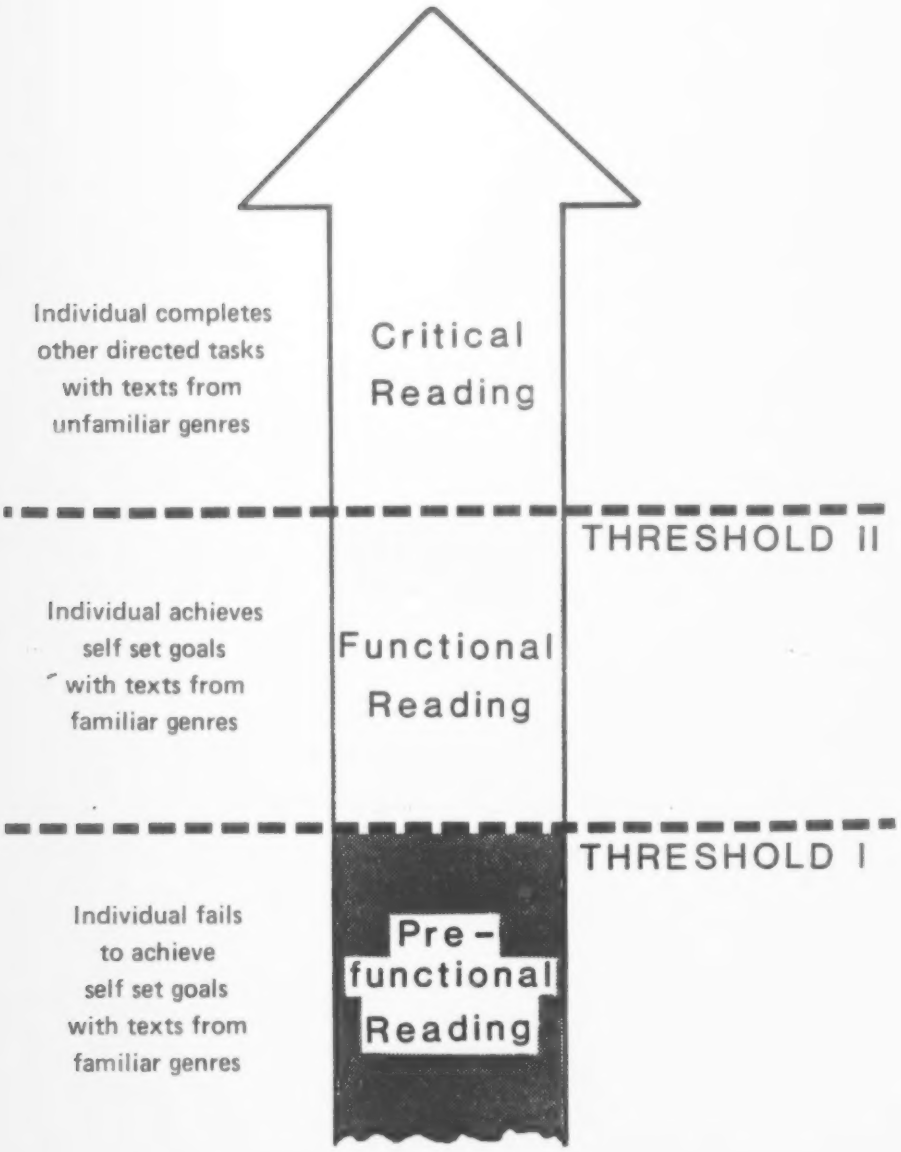
TABLE 2

Grade Equivalents of Critical Reading Test Scores

Number of Students	Grade Equivalents of Reading Scores
1	3.1 - 4.0
1	4.1 - 5.0
6	5.1 - 6.0
2	6.1 - 7.0
15	7.1 - 8.0
12	8.1 - 9.0
15	9.1 -10.0
29	10.1 -11.0
17	11.1 -12.0
20	12.1 -13.0
15	13.1 -14.0
10	14.1 -15.0
5	15.1 -16.0
5	16.1 -16.1+
Total 153	

FIGURE I

THE DEVELOPMENT OF CRITICAL READING


Individual completes other directed tasks with texts from unfamiliar genres
Critical Reading
THRESHOLD II
Individual achieves self set goals with texts from familiar genres
Functional Reading
THRESHOLD I
Individual fails to achieve self set goals with texts from familiar genres
Pre-functional Reading

Students who are adept critical readers, persons with skills developed beyond threshold II in Figure 1, can score poorly because of factors such as unpreparedness for the test, because of idiosyncrasies of the test that do not complement the examinees' problem solving skills, or because of irregularities in the administration of the test. In such cases, students enrolled exclusively in content area courses can be examined several months after failing a test, with a test comparable to that which they failed. And their scores can improve dramatically.

As an indication that equivalent, deficient scores on tests do not indicate persons with a common etiology for that deficiency, 28 students were examined. The freshmen students were examined at the beginning and at the end of 15 week basic skills reading courses. The range of grade equivalents to the early semester tests was 3.8 to 15.2. The mean gain for the group on the late semester test was 2.37 grades. There were two persons in the group who respectively made gains of six years and seven years.

Truely, can persons improve their reading skills so dramatically in such a brief period? If they could, the materials and methods employed in those courses should certainly be marketed; for the graduate students responsible for the teaching would surely become wealthy enterpreneurs. If not common sense, our experience persuades us to suspect the validity of the reading gains that have been documented. If a person has required 18 years to progress to

a level of reading characteristic of a fifth grader, there are no arcane strategies that will transfer that person quickly and effortlessly to the plane of reading appropriate for a highschool or college student. The persons who demonstrated advances of six or seven grades assuredly would have demonstrated gains if they had not participated in critical reading courses; the gains could have resulted from circumstantial changes or the adaption to a university environment. Instructors who work with genuinely disabled readers in clinical settings are aware of the time and effort required to advance the skills of a genuinely retarded reader one full grade level.

Just as there are persons who make astronomical gains in reading programs, there are persons who make no gains whatsoever. These are persons below threshold I, persons who have deficient functional reading skills. And finally, there are persons who are between threshold I and threshold II.

Which of these groups requires remedial instruction? Persons beyond threshold II don't require remediation. They may require a different test. Or they may require time to mature or adapt. They need to be monitored, to confirm that they can be successful critical readers; but they do not require remedial instruction.

Persons who are below threshold I, prefunctional readers, require remedial instruction. However, their level of disability is so severe that they are unlikely to benefit from university courses. They might be counseled to find a tutorial type of instruction to

reduce their problems. Only after having successfully completed this instruction could they participate effectively in university studies. The individualized remediation that prefunctional readers require is always expensive and often below the minimal baseline of scholarship that defines the missions of colleges.

If there is a group that can benefit from basic skills instruction, that group is composed of persons between threshold I and threshold II, a group characterized by the ability to read functionally but not critically. These persons can read effectively and autonomously -- but they have difficulty transferring these skills to restricted tasks with specialized materials.

Consider the case of private firms that prepare persons for standardized tests. These firms advertise that they can increase clients' scores on tests administered by Educational Testing Service and the American College Testing Program. After participating in a half-dozen workshops, clients will have improved their scores -- or their several hundred dollars in tuition allegedly will be refunded. One can be certain that such refunds are uncommon. The workshops cannot, in several hours, raise aptitudes for programs in law, medicine, or graduate school. And yet the workshops demonstrably can change the scores that are correlated with these aptitudes. What is provided in these workshops is a bank of information about the predictable eccentricities of the testing materials. Once aware of these idiosyncrasies, clients can make decisions about how to adapt skills they've already developed to the testing circumstances.

For parallel reasons, a basic skills critical reading course cannot remediate functional reading deficiencies efficiently. The comparatively modest goal of such courses is to define the problem that students are confronting. In a recent survey of British college textbooks, fifty-one verbal commands were identified as frequently occurring reading task delimiters (Table 3). Depending on the tasks that are specified, students should read the identical passage in distinct manners to be successful. To respond to different tasks it can be appropriate to isolate details, abstractions, main ideas, extrapolations, or the relationships between any of these. The two major instructional foci of critical reading courses are the specification of diverse critical reading tasks and the contraints exerted on those tasks by specialized texts. Such courses assume that students are beyond threshold I, that they are unable to apply the functional reading skills they have already mastered.

Summary

How pervasive is critical reading deficiency among entering college students? Critical reading test scores were reviewed to indicate that 79% of the persons in a sample drawn from basic skills reading courses achieved the scores that would be appropriate for highschool and even elementary school children. The pattern of test scores

TABLE 3

Frequently Occurring Words in Critical Reading Tasks

Survey	Respond
Examine	Value
Explore	Organise
Memorise	Reason
Know	Demonstrate
Evaluate	Remember
Analyse	Judge
Infer	Discriminate
Summarise	Deduce
Recognise	Assess
Recall	Create
Appreciate	Consider
Extrapolate	Discuss
Translate	Conjecture
Synthesise	Describe
Apply	Explain
Interpret	List
Identify	Represent
Construct	Hypothesise
Arrange	Appraise
Locate	Criticise
Select	Review
Outline	Precis
Find	Discover
Create	Compare
	Invent

Source: Harri-Augstein, S., Smith, M., & Thomas, L. Reading to learn. London, England: Methuen, 1982.

complements a two decade decline in verbal scores on college admission tests -- a decline that many have equated with the erosion of critical reading skills. However, evidence was reviewed to demonstrate that critical reading scores are not all impervious to instruction. Though some persons don't respond at all, others respond with dramatic advances during brief periods. Among persons who score deficiently, three subgroups can be discerned. 1) Some persons score deficiently because of eccentricities of a test or because of incidental circumstances that influence the test scores. 2) Some persons score deficiently because of inadequate functional reading skills. 3) And some persons score deficiently because they lack a sophisticated sensitivity to the full range of critical reading tasks and to the peculiar patterns of printed materials in the diverse academic disciplines. The research reviewed in this paper supports the establishment of programs that employ alternative measurement instruments to monitor the critical reading skills of entering college students. Additionally, this research provides a rationale for instruction as an efficient means of meeting the needs of at least one group of deficient critical readers.

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DEVELOPMENTAL STUDIES: A MODEL PROGRAM

by

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In September of 1970 the City University of New York adopted an open admissions policy that guaranteed a seat in the university to any student with a high school diploma; LaGuardia Community College was one of four colleges established to serve the influx of students. In its first decade LaGuardia's enrollment increased from five hundred students in 1971 to seven thousand in 1981. The original group of eight curriculum majors has expanded to fourteen degree programs and one certificate option in the areas of liberal arts, business, and allied health professions.

LaGuardia's missions have remained the same: to serve appropriately and effectively the needs of each segment of a diverse population; to give special emphasis to preparation of the individual for work and/or further study; to combine practical field experience with classroom instruction through a mandatory cooperative education program; and, through an extensive developmental studies program, to assume a special responsibility for service to adults, the handicapped, veterans, non-English speaking students, and other populations generally excluded from the mainstream of higher education.

The success with which LaGuardia has fulfilled these missions can be judged in part by the following two distinctions: In 1976, the United States Office of Career Education named LaGuardia a model cooperative education college in the United States; in 1982, the National Association for Remedial/Developmental Studies in Postsecondary Education (NARDSPE) presented its first annual John Champaigne Memorial Award for Outstanding Developmental Programs to LaGuardia Community College.

Developmental Studies Program

LaGuardia Community College accepted a responsibility to compensate for the basic skills deficiencies and second language difficulties of its students. The college's mission was established, its programs designed, and its faculty hired specifically to meet the needs of open admissions students. Over the years the priorities have frequently been re-examined and the approaches refined, but commitment to career education and to nontraditional learners remains unchanged.

The comprehensive developmental studies program at LaGuardia is a direct outgrowth of the college's commitment to open admissions students. Experience in the early 1970's with basic skills courses and support services convinced the faculty that an effective program must have at least two phases to it. The first would be the basic skills program itself: special courses in reading, writing, and mathematics, tutoring services, special counseling help, and so on. The second phase would be a systematic effort to help all faculty reinforce basic skills in all content area courses. Our experience suggested that for students to make permanent the gains acquired through basic skills courses and services, faculty in regular courses must know how to reinforce those skills in their classrooms.

Consequently, Phase I, the Basic Skills Program, is a tightly coordinated program designed and administered to ensure that all students acquire and demonstrate those skills necessary for success in their other courses and subsequent careers. Phase II, Integrated Skills Reinforcement, is a highly structured faculty development program designed to help faculty reinforce basic skills in their classrooms.

Phase I - The Basic Skills Program

LaGuardia's approach to developmental education must be understood in the context of the scope of its program. In the Fall of 1981 the college admitted 3000 new students. All students were tested for placement in reading, writing and mathematics before being allowed to register. The percentage of students with special needs in these areas was as follows: reading, 51 percent; writing, 70 percent; and mathematics, 77 percent. Nineteen percent of the students needed special instruction in English as a second language. To accommodate these students, the college offered 360 sections of basic skills courses in the fall quarter alone. The students were enrolled in "packages" of courses depending on their reading and writing capabilities. In addition to courses in reading, writing, mathematics, and ESL, the college also included in these packages courses in oral skills and critical thinking skills as well as weekly group counseling sessions conducted by a counselor. At the end of each of the sequences in reading, writing, and mathematics, each student was retested on an alternate form of the placement test to certify minimum competency.

For example, a student reading below the seventh grade level would receive the following package of courses in his first quarter at the college:

CSE 096	Basic Reading Workshop	5 hours
HUC 098	Basic Comm. Strategies I	4 hours
ENG 097	Basic Writing I	4 hours
Freshman Seminar	(orientation and group counseling)	1 hour

This program requires 14 hours of study each week and carries a total of 1.5 credits for the quarter. The student is encouraged to spend additional time as needed in the tutorial centers conducted by the departments involved in the basic skills effort.

There are 15 distinct courses in the college's Basic Skills Program. As indicated above, students receive mandatory assignments in packages of courses that are based on individual prescriptions determined by their placement test scores. The courses are:

		Classes	Labs	Credits
CSE 096	Basic Reading Workshop	3	2	½
CSE 097	Basic Reading I	3	2	½
CSE 098	Basic Reading II	3	2	1
CSE 099	Basic Reading III	3	2	1
ENG 097	Basic Writing I	3	1	½
ENG 098	Basic Writing II	3	1	½
ENG 099	Basic Writing III	3	1	½
HUC 098	Basic Communication Strategies I	3	1	½
HUC 099	Basic Communication Strategies II	3	1	½
MAT 098	Basic Mathematics I	4	1	1
MAT 099	Basic Mathematics II	3	1	1
ESL 096	ESL Workshop	7	2	1½
ESL 097	Eng as a Second Language I	2	2½	
ESL 098	Eng as a Second Language II	6	2	2½
ESL 099	Eng as a Second Language III	6	2	2½

The Basic Skills courses are offered in the following departments:

Communication Skills Dept. (reading)	CSE 096,	097,	098,	099
English Dept. (writing)	ENG 097,	098,	099	
Humanities Dept. (oral skills)	HUC 098,	099		
Mathematics Dept.	MAT 098,	099		
English as a Second Language Dept.	ESL 096,	097,	098,	099

Each of the five departments supervises its own tutorial center staffed by both full-time and part-time tutors. These tutorial centers provide a major support service offered by the college to enable students to advance at their own pace. The centers are generally open from 8 A.M. to 8 P.M. and are an essential feature of the developmental studies program. The tutorial centers are also the site of lab sections of various classes.

Administration. A program of the scope of LaGuardia's requires a great deal of coordination to operate efficiently. The college administration has recognized this need and been consistent in its support of this crucial aspect. The program is coordinated by the Director of Developmental Studies, a full time administrator reporting directly to the Dean of Faculty. A major task of the director is to ensure close communication among the five departments directly involved in the Basic Skills Program and between departments and the Basic Skills Office. The director heads the Basic Skills Office which handles all administrative aspects of the program such as placement testing of all students, retesting to ensure minimal competency, monitoring of students' progress, and so on. The Assistant Director of Developmental Studies is also an Assistant Registrar at the college; this arrangement ensures that all students are registered for the appropriate courses and sequences.

Perhaps the most important element in the coordination of this program is the Basic Skills Task Force, a standing committee of the college composed of a designee from each of the departments and divisions of the college (fifteen members in all) and chaired by the Director of Developmental Studies. The Task Force monitors all aspects of the Developmental Studies Program and recommends appropriate program refinements based on information collected from students, faculty, and administrators. The following are a few examples of policies that the Task Force has initiated:

1. A student may not drop a basic skills course

from his schedule except for extraordinary reasons and with special written permission from the instructor and the student's counselor. Since the student did not choose to take the course (it is mandatory) he may not elect to drop it.

2. Students entering college with developmental needs have very different skills backgrounds. Even with a carefully designed placement program, students in the same basic skills course sometimes have widely divergent skills levels. For this reason, besides the usual grades of A, B, C, D, F, and so on, instructors of basic skills courses may assign a grade of R. This is a non-punitive grade which indicates that the student has made significant progress but has not yet reached the exit criteria for the course. A student receiving an R grade must repeat the course.

3. All college courses have clearly defined prerequisites in terms of basic skills courses. This ensures that students have the appropriate educational skills to cope with the demands of the course. This policy is the result of a two-year effort recommended by the Basic Skills Task Force and carried out by the college's Curriculum Committee. The following example is taken from the college Bulletin:

> BDP 105 Computers and Society 3 hours, 3 credits
>
> This course is offered as a non-technical course for all the students interested in understanding the myths and realities of our computerized society. The intent is to familiarize the student with the terms and problems of the computer age. Basic knowledge of computer equipment and computer programming will be covered in terms of vocabulary of the computer world as well as actual experience with computer equipment. Each lecture will be related to a specific application of computers such as voting analysis, education, health, credit card billing systems, transportation and government systems.
>
> Prerequisite: CSE 098, MAT 098, Eng 099.

To the casual observer, LaGuardia's approach to developmental studies might seem an obvious one to adopt. Carefully coordinated procedures ensure appropriate placements. Linguistically integrated skills courses present a holistic approach to language learning. Teachers, counselors, and tutors functioning as a team ensure student progress. Standardized exams certify proficiency levels. Separate developmental and ESL sequences address the intrinsic differences between first and second language learning. Finally, a carefully planned prerequisite system addresses the issues of standards in content area courses.

These obvious features, however, represent a series of critical decisions made by the Basic Skills Task Force and the academic departments over a period of years. They reflect a willingness by the faculty, with the support of the administration, to discard unsuccessful practices and to approach with energy any intelligent procedures that might yield results.

Examples. Three current examples of our attitude towards developmental studies are worth noting. After two years of discussions, the mathematics department in 1980 adopted the position that in light of the availability of the hand calculator, the "basic arithmetic course" for college students should no longer have as its prime emphasis practice in algorithmic drill (e.g., how to do long division). Rather, the ability to solve problems should be the major emphasis of the course and students should be taught how to use the hand calculator intelligently. Topics such as estimation and approximation thus became important tools in the problem-solving process. A group of four faculty members developed materials for such a course and these materials have been used and refined over the past two years. The course represents a realistic educational approach to meet student needs rather than the continuation of traditional practices made questionable by the technological advances of our society. With the hand calculator and appropriate teaching materials, the time previously spent on non-productive drill can now be utilized far more profitably in learning and applying problem-solving strategies.

In 1978 the philosophy department began the development of a course in critical thought skills. Over the next three years the course was tested, evaluated, revised, and finally adopted as a "companion course" to the Basic Skills Program. The faculty in the philosophy department felt that the ability to think critically is truly a basic skill; so they pursued grant funding in order to carry their project still further. The department has since received substantial funding from the National Endowment for the Humanities to conduct a three-year cooperative effort with faculty in reading, writing, oral communications, mathematics and social sciences to infuse the teaching of critical thinking skills into these disciplines. The goals of the project are to systematically teach, integrate and reinforce the basic conceptual and thinking skills which are needed for academic studies and ordering life experiences; to provide a multi-disciplinary framework which will stimulate in students the process of self-awareness and personal growth; and to develop concrete teaching materials which reflect curriculum integration and can be replicated and used elsewhere. This effort began in the fall quarter of 1982 and will continue through 1985.

The third example of current work in developmental studies represents a joint effort by the English and data processing department in the college. The departments have been successful in obtaining grant funds to experiment with the use of microcomputers with word processing capabilities to teach basic writing skills to students. The project began in the Fall quarter

of 1982 and its focus is on those students who do well in technical courses but have great difficulty mastering basic writing skills.

Phase II - Integrated Skills Reinforcement (ISR)

As the Developmental Studies Program evolved during the 1970s LaGuardia faculty realized that the students' recently acquired educational skills declined rapidly unless used and reinforced. Thus, the belief grew that a truly effective program must engage all instructors of first-level regular college courses in the reinforcement of basic skills. With this goal in mind, the college in 1977 put together a team of four faculty members under the direction of Professor JoAnn R. Anderson, a communication skills specialist. The team's task was to design a faculty development program which would systematically retrain faculty to teach in their disciplines while simultaneously reinforcing basic reading, writing, oral and listening skills.

The product of the team's efforts, a program first piloted in 1978, is a highly structured inservice training program which assists content area instructors to consider the roles of reading, writing, speaking and listening in their courses; to determine the level of skill the student needs to meet course objectives; to use classroom techniques adapted from basic skills courses; to design lesson plans which help to extend the student's mastering of skills; and to make the student's effective use of skills part of the grading process.

The cornerstone of the program is a 300-page manual, ISR: Integrated Skills Reinforcement (Anderson, Eisenberg, Holland, Rivera-Kron, & Wiener, in press). Since 1978, thirteen to twenty instructors have been trained each year. The college has invested heavily in the program and substantial grant funds have also been obtained. So successful has the ISR project been that Bronx Community College of City University of New York, has obtained a grant for members of the LaGuardia team to train a team of Bronx faculty in ISR strategies.

Briefly, the ISR training program both informs and supports the participating faculty members. A department nominates a faculty member (in some cases more) to participate in the program for the year. There is no negative connotation to this nomination because the original ISR faculty-trainees in 1978 were carefully chosen from among the most respected teachers. The goal of the training is not to make "good teachers out of bad teachers;" no program can do that. Rather, it is to acquaint effective teachers with instructional strategies aimed at reinforcing reading, writing, oral and listening skills in their courses and provide opportunity for practice. The ISR program requires a two-quarter commitment from the instructor. The instructor is released from teaching one course during each of two quarters.

During the first quarter a faculty-trainee selects a course he or she will be teaching during the next quarter. The trainee studies

the strategies in the ISR Catalog and devises classroom applications for a single unit in the selected course. The emphasis on the single unit (often the first chapter in a text) is important because the trainee should not view the strategies as separate entities but rather as integrated skills reinforcement. During the quarter these activities are coordinated by a faculty-trainer (often one of the co-authors of the ISR Catalog). Three or four trainees meet each week for a two-hour session with the trainer to review their progress in the development of these materials. By the end of the first quarter the trainee has developed the materials to be tested in the classroom.

During the second quarter the instructor tests the materials in the classroom and uses extensive video taping to review the presentation and students' responses. The instructor also meets regularly with the faculty-trainer and his fellow trainees to discuss progress. The instructor revises the materials based on classroom experience. By the end of this quarter the instructor has completed the materials needed to integrate ISR strategies with the rest of the course syllabus and exams. The experience of the ISR Program over the past few years has shown that if faculty development in basic skills reinforcement is to be effective, it must rely on group settings and on the leadership of faculty in the skills areas to structure and supervise systematic training.

Does The Developmental Studies Program Work?

The evaluation of a developmental studies program is a problem that confronts many educators. What data to collect and how to analyze the collected data are subjects for debate among different groups. Since 1971 the Office of Institutional Research at LaGuardia has conducted many studies of significant value which have led to refinements indicated by the analysis of student and faculty feedback and statistical data. Because of the difficulty in defining the term "success" for nontraditional college students, it is questionable whether a developmental program can be evaluated in the summative sense of the term (i.e., does the program succeed?). Educators, however, must attempt to gather data so that some criteria can be applied to determine whether what program personnel are doing is worthwhile.

Some educators believe that student attrition is one valid measure of the success of a developmental program. They would argue that students who are no longer in the college cannot be helped by the college. A study conducted by the central office of the City University of New York is of interest in this context. The study involved students who entered the nineteen colleges of the university in the Fall of 1978. Students were separated into two groups: those whose placement tests indicated a need for instruction in basic skills (reading, writing, math) and those who tests indicated no such need. The study then gathered data about the students who were still in the university in the Spring of 1980.

The study showed that for the university as a whole (and for community colleges as a group) attrition among students who entered needing basic skills instruction was greater than that for students who needed no such instruction. This was, of course, not very surprising. For LaGuardia, however, the data showed an unexpected result: Attrition among students at LaGuardia who entered needing basic skills instruction was less than attrition among students who needed no basic skills help. Since the college does have academic probation and suspension policies, this result seems to be significant. The program helps underprepared students to stay in college, continuing their education.

LaGuardia's developmental program has many levels. For example, a student may enter needing only one basic skills course in one area, or needing as many as twelve basic skills courses spread over a number of academic areas. Some educators would argue that the best measure of the success of a developmental program is whether a student who enters at any level can achieve the associate degree. A study was conducted of the students eligible for graduation at LaGuardia in March, 1981, the end of the Winter quarter. The study revealed that of the 210 students eligible to graduate that quarter, 83 percent had needed basic skills instruction when they entered. A close look at student records indicated that graduates had entered LaGuardia at every entering skills level. The study indicates that, given motivation and perseverance, students can enter the program at any skills level and expect to graduate.

In his letter to President Joseph Shenker of LaGuardia Community College on the occasion of the awarding of the first John Champaigne Memorial Award, President Hunter R. Boylan of the National Association for Remedial/Developmental Studies in Postsecondary Education (NARDSPE), stated that the award was given to LaGuardia's developmental education program because it represented "the best of current practice in the field." He also stated that the award was granted to LaGuardia "because of its long-standing commitment to excellence in developmental education; its use of current research and methodology in the design of program services; and the high quality of its services to students."

We at LaGuardia are proud of what we have accomplished in the field of developmental education over the past twelve years. We are, however, equally aware that we have just begun to scratch the surface in our goal of enabling each student to succeed in his or her education. Questions such as how to use the microcomputer in developmental education will continue to keep us alert. We know that we will never have all the correct answers. We must, however, take great care to ensure that we continue to ask ourselves the right questions.

FOLLOW-UP STUDIES OF TEACHER EDUCATION PROGRAM GRADUATES

by

Edward L. Kirk

Abilene Christian University

FOLLOW-UP STUDIES OF TEACHER EDUCATION PROGRAM GRADUATES

> The institution keeps abreast of emerging evaluation techniques and engages in systematic efforts to evaluate the quality of its graduates upon completion of their programs of study and after they enter the teaching profession. This evaluation includes evidence of their performance in relation to program objectives.
>
> The institution regularly evaluates its teacher education programs and uses the results of its evaluation in the modification and improvement of those programs. (1:11).

I. INTRODUCTION

Why Follow-Up Studies?

There is little doubt as to the necessity for periodic follow-up studies of teacher education program graduates by those institutions which desire approval by The National Council for Accreditation of Teacher Education (NCATE). Standard Six is very clear on this point. If it were not for this mandate, many schools would doubtless neglect to study the outcomes of their own efforts. Why this reluctance? One possible explanation might be that the anticipated effort, cost, and time requirements of such a study are a bit discouraging. Maybe the expectation that the study will yield very little that can be used in program planning and improvement is another discouraging factor. Also, those who are responsible for teacher education programs might be somewhat apprehensive about the results of such a study. (2:18).

The Values of a Follow-Up Study.

A properly planned and executed follow-up study of teacher education program graduates can be of great value. Although an institution may be visited by NCATE representatives only once in seven years, representatives

from the state department of education probably show up more often. University administrators, boards of trustees, and others may want justification for existence at any time. Follow-up study data can provide evidence to assist in that justification. This responsibility becomes increasingly difficult without the benefit of accurate data from a defensible follow-up program. But evaluation data should not be just for NCATE or state representatives; it should be for those who are actually engaged in preparing teachers and in the designing of programs to meet their needs. (4:24).

A properly planned and executed follow-up study of teacher education program graduates should reveal:

(1) The extent to which the graduates are accomplishing the personal and professional goals for which they were prepared.

(2) The effectiveness of various aspects of the teacher education program.

(3) The strengths and weaknesses of the teacher education program as perceived by its graduates.

(4) Suggestions for program improvement based on the results of responses made by graduates of the program.

(5) The mobility and location of program graduates.

(6) The number or percentage of program graduates who were employed immediately upon graduation.

(7) The number or percentage of program graduates who accepted employment in areas other than teaching.

(8) The number or percentage of program graduates who continue in school rather than seek employment.

An effective follow-up study of teacher education program graduates should provide information helpful in answering such questions as course effectiveness, the proper sequence of courses, factors relating to the achievement and success of graduates after entering the teaching profession, better methods of instruction, and the degree to which the stated objectives and competencies of the teacher education program are being realized.

II. THE NCATE REPORTS

The NCATE Reports in General.

According to NCATE, the maintenance of "acceptable teacher education programs demands a continuous process of evaluation of the graduates of existing programs. . ." (1:10). There can be little doubt but that NCATE Standards have stimulated the conducting of follow-up studies of teacher education program graduates. In spite of the stimulation applied by NCATE, violation of the Standard calling for the follow-up studies was cited as a weakness in fifty-eight percent of the programs reviewed during 1979, a rate second only to the violation of the governance standards. (2:18).

An Examination of Ten NCATE Reports.

Ten specific reports submitted by institutions to NCATE from 1971 to 1981 were examined with special attention being given to that section of the report dealing with "Evaluation, Program Review, and Planning." (Standard Six, 1981). No method of random sampling was utilized in choosing the reports to be examined; the ten which were readily available were utilized. (5:0).

A Summary of the NCATE Reports.

After examining the ten reports submitted to NCATE by the various institutions desiring NCATE approval, the following observations or conclusions relative to them seem warranted:

(1) Standard Six of the NCATE Standards is a definite stimuant to the conducting of follow-up studies of teacher education program graduates.

(2) The intervals at which follow-up studies are conducted seem to vary from three to ten years. This may be open to question as it was not always possible to determine the exact interval from the informaton contained in the NCATE reports.

(3) Almost all schools seem to utilize a variety of informal ways to attempt to assess the effectiveness of their work.

(4) Most formal follow-up procedures utilized a survey questionnaire mailed to teacher education program graduates and to their principals or supervisors.

(5) Relatively few of the schools utilized the National Teachers Examination or other measures which would enable them to compare their graduates with some type of national standard or norm.

(6) Most of the schools utilized some type of pre-service evalution of specific courses by the teacher eduction program participants.

(7) Most of the schools attempted to analyze the results of their follow-up efforts in some way. The analyses ranged from simple tabulations to the use of elaborate charts, comparisons, and statistical procedures.

(8) Most of the schools indicated some attempt to utilize the results of their follow-up studies for program improvement or modification.

III. RECOMMENDATIONS

The Questionnaire.

Since the use of some type of questionnaire to first year teachers and to their immediate supervisors appears to be the most widely used technique for securing information about the effectiveness of teacher education programs, the following suggestions are offered in connection with the use of such questionnaires and about follow-up studies in general:

(1) Although there may be a desire to send questionnaires to all graduates to exhibit an interest in everyone, consider using a carefully chosen sampling technique to select a sample from the class or group to be surveyed. The use of such a sample is common in surveys today and has proven to be an effective practice in many situations.

(2) The group to be surveyed should be identified at least one year prior to their graduation so that they may be oriented as to the nature and importance of the follow-up study before they leave the campus. This planning with students while they are still in school will cause them to be more likely to respond and to recognize the value of the study since they understand why it is being conducted.

(3) Consider the possibility of encouraging certain groups of students to help plan the study and to assist with the collection of the data so that they learn from firsthand experience how the results are to be used to improve the program of preparation.

(4) An individual should be designated to be responsible for the follow-up study early enough to allow that person to plan and execute the on-campus orientation. Perhaps the chairman of the education department, the certification officer, or the director of laboratory experiences should be responsible for the study.

(5) Every effort should be made to maintain contact with the graduates of the target group or class between the date of graduation and the time of the follow-up study.

(6) Questionnaires should be accompanied by a cover letter which explains how the results will be used, why responses are needed from everyone, and how confidences will be kept.

(7) The appearance of the questionnaire will have considerable effect upon the percentage of returns.

(8) Arrangements should be made to follow the original questonnaire with a personal letter urging return of the questionnaire.

(9) Check with a legal counselor to determine if first-year teachers should be asked to sign a form authorizing their supervisor or administrator to evaluate their performance on the administrator's form of the questionnaire.

(10) Provisions should be made for additional mailings to those who do not respond.

(11) Arrangements should be made for machine processing of the questionnaire and for statistical analysis by a computer system whenever possible.

(12) An address list should be compiled as soon as possible utilizing all available resources—certification files, alumni files, placement files, letters to parents, telephone directories, etc.

(13) Investigate the possibility of making the questionnaire a durable mailout on a single sheet which can be folded, sealed, and mailed directly.

(14) Investigate the feasibility of telephoning non-respondents, especially if the total response rate falls below sixty percent of the total sample.

(15) A summary of the results of the follow-up study should be provided to those who might profit from knowledge of the results. Steps should be taken to implement modifications of the teacher education program as indicated by the results of the study.

What About On-Site Interviews?

While the distributed questionnaire, organized in a check-off format, has the advantage of clear-cut responses and can yield a good return, especially if mandated by an administrator, there is the problem of what to do with the answers to assure their validity or to expand on the suggestions which are made. Depending upon the objectives which one expects to achieve, an on-site interpersonal approach may be better. The respondents are more apt to respond openly to a frank discussion than to a series of blanks on a sheet of paper. Although it may take much more time to find out what's going on, the personal effort can be worthwhile in developing reliable information. The relationships among teachers, administrators, and others, hidden by individually checked questionnaires, may be made much more evident by face-to-face interviews. It would be an administrative decision as to whether or not on-site interviews are productive enough to warrant the time, effort, and expense involved. (3:24).

NOTES

1. Standards for Accreditatin of Teacher Education. Washington: National Council for Accreditation of Teacher Education. March 1, 1981.

2. Lillian Katz, James Rath, Chandra Mohanty, Akemi Kurachi, and Joyce Irving. "Follow-up Studies: Are They Worth The Trouble?" Journal of Teacher Education. March-April, 1982. Volume XXXII, Number 2.

3. Jon T. Powell. "Developing an Effective Survey." Media and Methods. January, 1982. Volume 18, Number 5.

4. Ronald Adams, James Craig, Shirley Hord, and Gene E. Hall. "Program Evaluation and Program Development in Teacher Education." Journal of Teacher Education. September-October, 1981. Volume XXXII, Number 5.

5. Reports submitted to NCATE by the following schools were examined:

   Saint Mary College. Leavenworth, Kansas. 1971
   High Point College. High Point, North Carolina. 1975.
   Bethany College. Lindsborg, Kansas. 1975
   Southern Missionary College. Collegedale, Tennessee. 1976.
   Central College. Pela, Iowa. 1978.
   Custavus Adolphus College. St. Peter, Minnesota. 1978.
   Carleton College. Northfield, Minnesota. 1979.
   Albany College. Albany, Georgia. 1981
   Indiana Central University. Indianapolis, Indiana. 1981.
   Livingston Unviersity. Livingston, Alabama. 1981.

THE IMPORTANCE OF WRITING TO CHEMICAL ENGINEERS

by

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Abstract

An article titled "Putting College Back on Course" appeared in the September 19, 1983 issue of Chemical Engineering. The authors reported the results of a survey to which 3599 U.S. educated chemical engineers responded. The survey directed questions at graduates from schools of chemical engineering over the last ten years regarding the effectiveness of their undergraduate education. One result of this survey was that writing skills were rated second in importance to chemical engineers after material and energy balance calculations. It was also a subject which was formally studied by only 3.9% of the graduates in college. Added work in this area was done after graduation by approximately 62% of the chemical engineers responding to the survey, either by seminar participation or self study through correspondence courses.

Since the chemical engineering curriculum is already crowded, it would seem that the only feasible way to develop writing skills is to build relevant assignments into the existing curriculum. Writing is done primarily in laboratory courses and in senior design. However, each course has homework, and instructions for homework composition are also needed. The presentation of tables, figures, and calculations are often an integral part of engineering writing. A guide to writing was prepared by the faculty and has been adopted as a departmental standard to assist the student in developing effective writing skills.

One comment from a survey participant in the above mentioned article is relevant to all persons interested in education:

"It is unreasonable (even cruel) to send people into a real world unprepared for reality." (Dennis Stewart, McKees Rocks, PA).

The Importance of Writing to Chemical Engineers

Introduction

The educational process has two principal objectives: 1. conveying the factual content of a subject to the student; 2. developing student learning, communication, and thinking skills. The latter is by far the more important and difficult task.

Traditionally, engineering education has emphasized technical content of subject matter and to some extent assumed the existence of learning, communication, and thinking skills. Since engineering is by its nature a problem solving activity it develops student ability to solve problems in content areas. However, because the factual content of an engineering education is so large, less emphasis than is perhaps warranted has been allocated to development of communications skills and styles of learning.

Evidence supporting the argument that inadequate attention has been paid to development of engineering student communications skills is found in the fact that some large industrial companies have a policy of sending all newly employed entry level engineers to writing seminars at company expense. The companies apparently feel the investment is worth the money. It does suggest, however, that there is a chasm in the education of engineering students which could be filled by appropriate skill development activities. While we might argue about the screening role of educational institutions, we must also consider what the basic skill levels should be for any task. This gives both student and teacher an objective standard against which to compare performance.

We have all seen expressions of concern in the national media regarding aptitude and skill performance levels of American students versus other

national groups or even versus ourselves in previous decades. Perhaps the time has arrived for significant reemphasis in basic skill development at all levels of education.

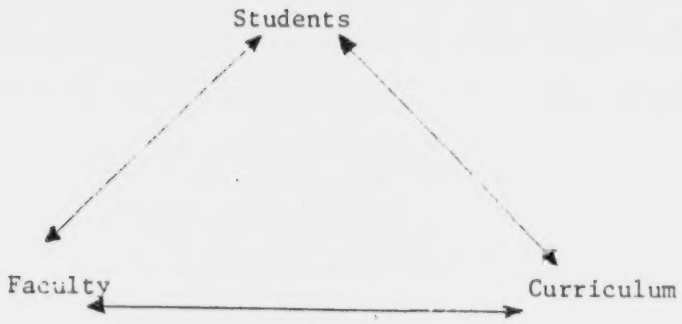
Background

An article titled "Putting College Back on Course" appeared in the September 19, 1983 issue of Chemical Engineering. A nationwide survey of 3599 graduates of U.S. chemical engineering programs in the last decade revealed that writing skills were rated second in importance after material and energy balance calculations by the graduates themselves. Yet only 4% of the students had formal training in these skills in college while 62% took additional formal training in writing after graduation.

Elements of an Engineering Education

Engineering education results from the interaction among three elements: the faculty, the students, and the curriculum. This is illustrated in Figure 1. For this reason, each element is essential to the process. In addition, some specialized equipment and materials such as laboratory facilities and library resources are required.

Consider the source of engineering educators: they are principally the best of the PhD graduates of engineering curricula. Some, but not all, will have several years of industrial experience. This is quite appropriate since an effective teacher should know the subject. However, as with other university disciplines there is no requirement for the faculties to have any formal training in teaching methodology or educational psychology. The result is that in our early teaching careers we teach on the basis of "instinct" and knowledge of subject matter. Gradually, we each discover a



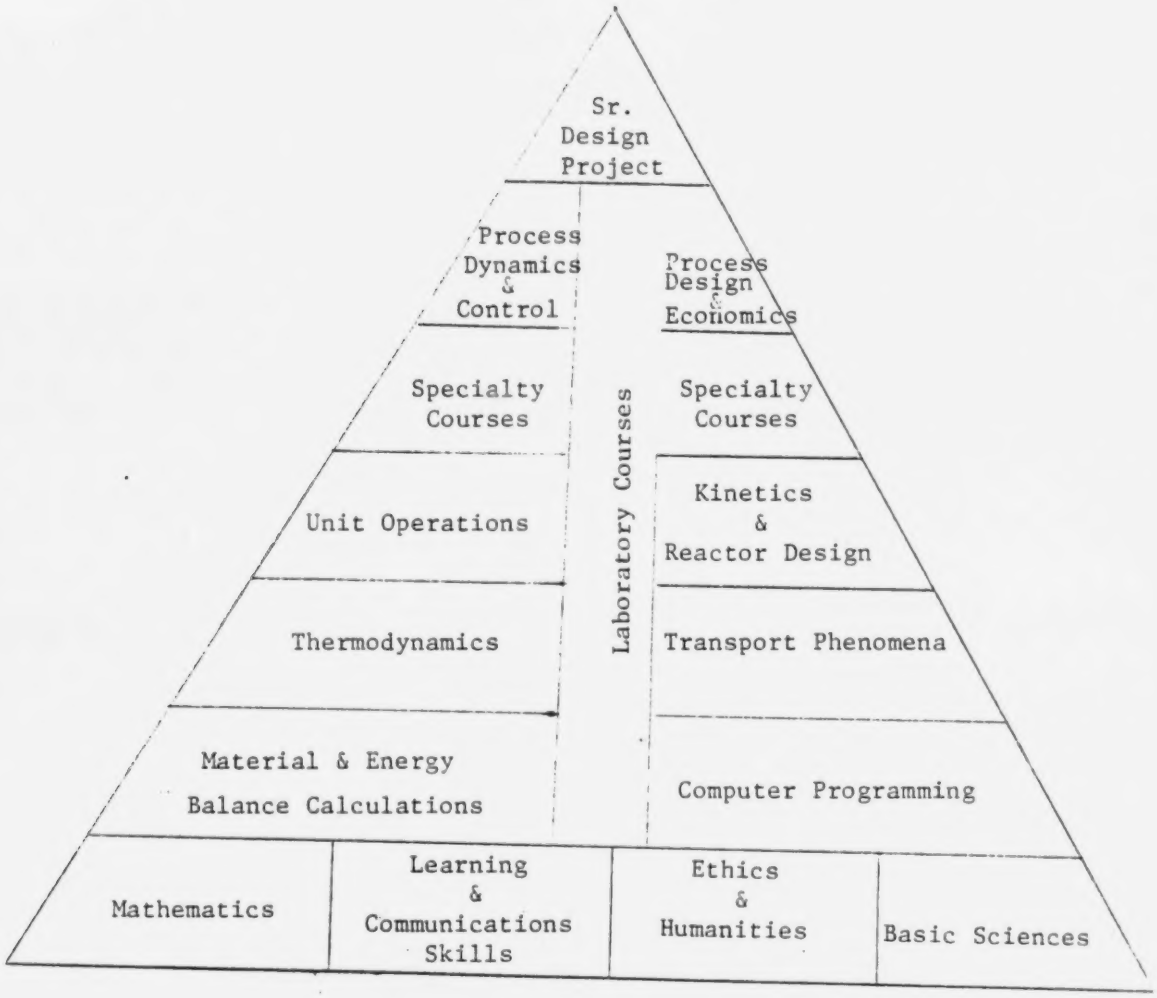
Key Elements of an Engineering Education

Figure 1

"style" suited to our personalities. Depending on personal inclination this can lead to a wide range of methods to develop student skills. Since most of our own educations heavily emphasized problem solving and deemphasized writing and other communications skills until at least the graduate level, it takes some time to realize that these skills can and should be addressed at the undergraduate level.

Consider the students entering an engineering program. They are typically high school graduates with strong problem solving skills (by comparison with their peers, at least), but sometimes they have less well developed verbal skills. They believe they like technical subjects, and they can see the obvious utility of an engineering education. However, they usually have only a vague notion of what engineering is.

Consider the curriculum. Figure 2 illustrates the structure of the undergraduate chemical engineering curriculum. It consists of basically lecture courses and laboratory courses. Lecture courses are interactive between teacher and student through question and answer and demonstration by the teacher of solution methods to problems. The laboratory courses are interactive again by question and answer and also by illustration of how to use equipment. The tasks which must be performed by engineering students in lecture courses are primarily a series of homework exercises. These are usually groups of highly structured problems to be solved and they require the student to apply his knowledge of the subject matter in combination with more general problem solving methods. This develops the student's ability to solve such highly structured problems. Typically, less well structured problems (design-type problems) are left to senior level courses where the student begins to have enough technical knowledge to attack these kinds of problems. In the chemical engineering curriculum, a senior level design project is



An Undergraduate Chemical Engineering Curriculum Model

Figure 2

required for graduation. Indeed, a national contest is sponsored by the American Institute of Chemical Engineers and they furnish this project problem to all participating schools for use during a particular 30 day period in the spring semester of the senior year.

The basic elements of solving the determinant type of problem typical of the undergraduate chemical engineering education are illustrated in Figure 3.

In the laboratory courses, the tasks to be done are experiments which require manipulation of equipment and materials. They require the recording of information about the performance of the equipment and materials. An evaluation of the results obtained is done and a report is turned in to the instructor. Thus the written tasks in the laboratory courses are of two types: (1) laboratory notebooks and (2) laboratory reports.

What, then, are the basic written tasks which must be performed by the chemical engineering students? They are:

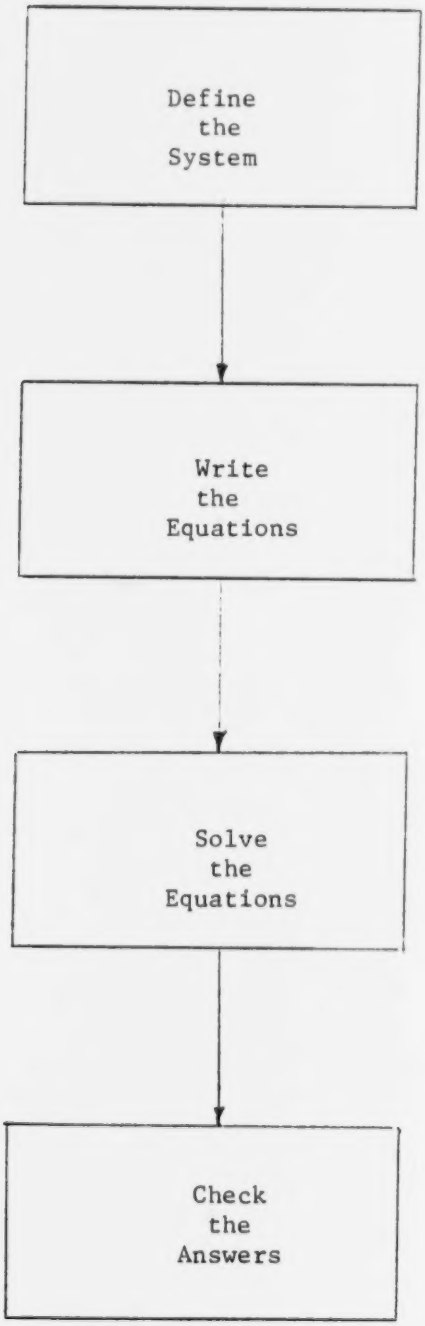
(1) homework (including computer programs)

(2) laboratory notebooks

(3) laboratory reports

(4) senior design report(s)

Thus it appears that with a little effort, the opportunity exists to structure the numerous written assignments in such a way that writing skills as well as problem-solving skills are developed. By setting departmental standards for such perennial student difficulties as organization, format, and mechanics we can help the student focus on structuring his thought processes about the task at hand. This has, in addition, the added benefit of making the work easier to grade because the faculty will know where on the student papers to look for particular steps. Since engineering writing is very likely to be different from his previous writing experiences, we can do the student a real favor by



A Chemical Engineering Problem Solving Model

Figure 3

simply making him aware of the fact that a difference in expectation exists. To do this, we must provide standards which are as uniform and objective as possible.

Addressing the Problem

Reflection on these problems and opportunities by faculty in the Department of Chemical Engineering at NMSU led us to form an interested group to address this issue. To assist in keeping the treatment of the issues balanced, a faculty member in the department of English was added to the group. Several meetings ensued, and it was agreed that a student guide and departmental standard for all written work should be prepared. After some discussion we agreed on a division of effort. Each of us prepared our work in our own areas and submitted copies to each other for review before each succeeding meeting. During this process we decided to broaden the scope of our effort to include an effort dealing with some aspects of problem solving. A general editor was chosen from the group. His job was to manage the overall effort.

A draft was produced and tested by the students for a semester. Their comments were received and over the summer the editor undertook a major revision. This effort was reviewed by the other authors in the late summer of 1983 and the first edition of our guide was issued as a departmental standard in the Fall of 1983. Since that time, comments have been received from a variety of interested parties and a second major revision has been undertaken. The second revision has just been completed and will be issued to our students this spring. Figure 4 presents the Table of Contents of our new version of the guide. Of course, the copyright is being registered.

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A Guide to Writing and Problem Solving for Chemical Engineers

Figure 4

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Results and Conclusions

What have been the results of the use of our guide? When the project was undertaken we had some discussion about how to measure results, but we concluded that the need for some sort of guide was so great that we should proceed with producing it for student use as soon as possible. Thus we disregarded formal instruments for measurement of its results. Indeed, it would be very difficult to devise a control group study in our department because it would be impossible to prevent the guide from getting into the hands of the control group.

Therefore, at this point in time we have only our own judgement of the results of our effort combined with student comments as to its helpfulness. The fact that all faculty in our department, and not just those who participated in the preparation of the guide, have adopted it as a standard strongly suggests that the need was felt by all of us and the resulting guide is considered very helpful by all of our faculty. As for the student view, the comment of one student on an anonymous faculty evaluation perhaps reflects their attitude best:

"A good book. Well worth the price."

References:

1. Barna, B., Bridges, C.W., Long, R.L., Rakow, A., A Guide to Writing and Problem Solving for Chemical Engineers, NMSU, 1983.

2. Lipowicz, M.A., and Hughson, R.V., "Putting College Back on Course," Chemical Engineering, September 19, 1983.

COGNITIVE MODIFIABILITY FOR INDIAN ENGINEERING STUDENTS

by

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COGNITIVE MODIFIABILITY FOR INDIAN ENGINEERING STUDENTS

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Indian Resource Development, New Mexico State University

Retention of college students enrolled in engineering, science and mathematics degree programs is critical. Most Indian students who start out in engineering majors are not retained. In 1983, when 18% of the total enrollees in engineering nationwide graduated, only 9% of the American Indian engineering enrollees were finishing the four-year program. The dropout rate of American Indians in engineering in New Mexico institutions is alarming. A survey of Indian enrollment at three New Mexico institutions (New Mexico State University (NMSU), University of New Mexico (UNM), and New Mexico Institute of Mining and Technology (Tech)) shows that in 1984, there were 58% fewer Indian engineering students in the junior and senior classes than in the freshman and sophomore classes. The percentage for NMSU is a much lower 33%, but this is still too high. Traditional retention programs, even those aimed particularly at minorities, have most often not proven successful with Indians. The critical situation challenges universities to try something different. Unless the Indian engineering dropout rate is reduced, the waste of potentially valuable scientific and technological leadership will continue.

Tribal members who are scientifically and technically trained and who retain the values of the tribe are vitally important to natural resource and economic development on reservations. Often tribes have hired non-Indians to make critical decisions in reservation resource

development. However, tribes have become increasingly reluctant to continue this practice. The reason is that they find that when they must rely on individuals and corporations that do not share their values regarding land and natural resources, the tribes cannot effectively exercise control over development. Until a corps of professional Indian people is trained for tribal leadership in engineering, science, business and agriculture, neither the Indian tribes nor the nation will derive all the possible benefits of resource development on Indian reservations.

Indian Resource Development (IRD), headquartered at NMSU, along with the minority retention programs of the UNM and Tech, has devised a project to address the problem of retention of Indian students in technical majors. While most Indian retention programs have approached the problem through remediation, IRD proposes to attack it through training of college students in the skills of cognitive modifiability. Cognitive modifiability training is an innovative effort to overcome the difficulties in learning and produce capable scientific and technological personnel.

The theoretical basis of this intervention program and its original experimental application were developed by Dr. Reuven Feuerstein, Director of the Hadassah-Wizo-Canada Research Institute of Israel. The program, Instrumental Enrichment (IE), is designed to help adolescents who lack the trait of cognitive modifiability "increase the capacity ... to become modified through direct exposure to stimuli and experiences provided by the encounters with life events and with formal and informal

learning opportunities."[1] American Indian students, like Feuerstein's subjects, are often raised between cultures, neither in the mainstream culture, nor in a traditional culture. When an integrated culture is not passed from generation to generation in the family, it is believed that certain cognitive qualities, such as analytical and comparative functions do not develop in the child. Inherent in the transmission of any culture is the subtle teaching of how to reason clearly. When children are on the margin of two cultures they have notable difficulty in thinking with precision. Feuerstein describes the syndrome of low cognitive modifiability this way: Some families live in "cultures of transition," where old values are not accepted but neither are the new values of the new culture they are moving into. These social disorganizations lead--even if there is no material poverty--to cultural deprivation. It is not a matter of any culture being deficient, but of the children being deprived of a culture. The parents, in conditions of cultural deprivation, do not act as agents of mediated learning.[2]

Feuerstein's theory is that the mediated learning experience is the basis for cognitive change: that is, the individual's ability to respond adaptively to a changing environment by using higher mental processes. In transmitting culture between generations, parents mediate a child's direct experience with the world by requiring the child to focus on certain stimuli and respond in specified ways. While transmitting the

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[1]Reuven Feuerstein, Instrumental Enrichment: An Intervention Program for Cognitive Modifiability (Baltimore: University Park Press, 1980), p. 115.

[2]Feuerstein, 1980, p. 339.

past and representing the future, the parent requires of the child abstract thinking, elaborated symbols, and higher mental processes. If this cultural transmission has been lacking in a child's upbringing, then he or she will not have the tools with which to attack new stimuli or adapt to a new environment; the child will lack cognitive modifiability.

The analogies between the Israeli students in Feuerstein's studies and American Indian students are evident. Lifestyles of American Indians range from those families raised in the suburbs of Washington, D.C., to those living in very traditional pueblos. Many Indian families who live on the edges of the reservations or in large city ghettos don't accept and practice either the old ways or the new Anglo culture. A fragmented form of the culture is transmitted to the next generation. An analysis of Indians who are successful in highly demanding professions shows that they are almost evenly divided between having been raised by their grandparents in very traditional homes and having been raised in mainstream middle-class homes.[3]

The good news in Feuerstein's theory is that even though children may not have sufficiently developed cognitive functions, late adolescents or even older individuals can be taught cognitive change. Feuerstein has developed a set of exercises, Instrumental Enrichment (IE), to increase the individual's capacity for cognitive modifiability. The more than 500 pages of exercises are divided into 20 instruments. Each instrument is concerned with some aspect of cognitive structure, such as

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[3]Susan Supernau. "Bridging Two Worlds: The Working Indian." Unpublished Manuscript, December, 1981. Albuquerque, NM.

analytical perception, comparisons, orientation in space, categorization, or classification. Feuerstein notes that Instrumental Enrichment is content-free, and that the skills taught can be bridged to the content area that the teacher wishes to. IE will produce insights into cognitive functioning for the student which he or she can then apply to other areas--both academic and practical.

In Feuerstein's original work in Israel he found that subjects who had receiving IE training scored higher on a test of general intelligence and on other achievement tests than control group subjects. Moreover, IE subjects scored significantly higher than controls on the intelligence test administered two years later upon the subjects' induction into the Israeli army.[4] In a systematic replication of Feuerstein's program undertaken on a population of culturally disadvantaged adolescents in a vocational school system in Ontario, Canada, the experimenters concluded that IE "can positively affect the cognitive development of academically low-functioning adolescents."[5] Staff of the NiHa'AlchiniBa Educational Programs in Shiprock, New Mexico, have results from use of IE in the curriculum of an alternative high school for Navajo students, and in two summer programs for groups of Indian high school students. Comparison of differences between pre- and

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[4]Reuven Feuerstein, Ronald Miller, Mildred B. Hoffman, Yu'acov Rand, Yael Mintzker, and Mogens Reimer Jensen, "Cognitive Modifiability in Adolescents: Cognitive Structure and the Effects of Intervention," Journal of Special Education, 15, (1981), p. 285.

[5]Harvey Narrol, Harry Silverman, and Mary Waksman, "Developing Cognitive Potential in Vocational High School Students," Journal of Educational Research, 76 (1982), pp. 107-112.

post-test scores for an IE group and a comparison group shows IE provided superior training to that of the comparison group.[6]

The minority engineering programs at NMSU, UNM, and Tech participated, along with other universities in the Southwest in the National Association of Minorities in Engineering Program Administrators (NAMEPA) Region 6 Special Task Force on Indian Education in formulating the idea for and carrying out the American Indian Retention Program, a pilot project to be held in summer 1983 for one week to begin cognitive modification training with Indian students who had enrolled as freshmen in engineering or technical majors at one of the three New Mexico institutions, NMSU, UNM, or Tech. The National Action Council for Minorities in Engineering (NACME) provided seed money for the project that would give American Indian students cognitive training using Feuerstein's Instrumental Enrichment concepts. The goal was improved academic achievement and retention. This goal is measurable, and the project planners believe it is attainable.

Indian students who had enrolled as freshmen in engineering or technical majors at one of three New Mexico institutions, UNM, NMSU, and Tech were invited to participate. Twenty-one Indian students self-selected, eleven of whom were women. There were eleven Navajos, nine students from various Pueblos (San Felipe, Tesuque, Cochiti, Santa Ana and Laguna), and one Kiowa. The participants ranged in age from seventeen to twenty-four.

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[6]Letter received from Larry Emerson, Director, NiHa'AlchiniBa Educational Services, Shiprock, NM, 20 September 1984.

The basic purpose of the American Indian Retention Program was to introduce participating students to IE and provide them with training on several of the initial instruments. Substantively, this included diagnostic testing, cognitive development instruction, and evaluation of student progress. The seminar also featured intensive training in study skills and strategies for coping effectively with university life.

The Ravens Progressive Matrices test was administered at the beginning of the week to get a sense of the students' thinking ability. This test was chosen because it may correspond to the Feuerstein Structural Cognitive Modifiability theories in that the student must exercise "clear thinking" by using and calling into action a number of cognitive functions in order to solve the tasks. The mean score of the students was 51.3 out of 60. The males had a mean of 53.1, and the females one of 49.2. These scores put this group of students at the mean national percentile of 95%.

The instructors thus were challenged to refine the cognitive abilities of a group of bright, motivated students. The instructors assumed that even though the students demonstrated a high degree of cognitive efficiency, they still could use some instruction in basic concepts of comparisons, planning behavior, definition of problems, establishing of parameters of problems and solutions, analytical perceptions, and spatial orientation. So the instructors planned to provide some "basic training" in IE and to bridge to the Indian background of the students and to their proposed careers. Bridging is considered an essential component of IE, and the skill of the instructor in doing this is most important. Mr. Larry Emerson and Ms. Janet

Slowman, Navajo Indians and certified and experienced IE instructors, are very skilled in bridging.

Mr. Emerson began the week with a lecture on the theory of structural cognitive modifiability and the mediated learning experience as it relates to Indian education and Indian contemporary society. He pointed out that students could look at engineering as a process of thinking. A major assumption to begin with is that no culture is better than another with respect to development of thinking skills. Nevertheless, there are many young people today who are alienated from their Indian culture. But, Mr. Emerson pointed out, problems in cultural understanding can cause problems in one's cognitive abilities. Cognition and culture are related, and if one loses one's culture, one will lose other abilities as well. He said that learning to think enables the Indian student to discriminate, to pick and choose among the values of Indians and non-Indians. He noted that low self-concept has been identified as an educational obstacle among many Indian students. Thinking independently enhances one's self-esteem; the better one is able to handle information, the better one's self-concept. During the week ahead, he told the students, they would be able to slow down the thinking process; they would learn how to think about things. Being Indian, or being from a different cultural background, should not be impediments to being successful in college.[7] This lecture set the stage for the next week's Instrumental Enrichment instruction.

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[7]Perry Horse. "Evaluation Report: Indian Engineering Freshmen Seminar, August 7-12, 1983." Unpublished Manuscript, 1983. Albuquerque, NM. pp. 7-8.10

The IE classes were held twice a day for five days. The group of 21 students was divided in half, and two class sessions were held simultaneously led respectively by Mr. Emerson and Ms. Slowman. The modified Instrumental Enrichment classes consisted of drawn or written exercises, separated into instruments, each instrument stressing a fundamental concept. Unlike many traditional styles of instruction, the answers weren't hidden. Initially the strategies for doing well were discussed by the group. New ideas were elicited from the students. After individual work with the exercise, the concepts employed in the exercise were bridged back to other examples of academic work. Although the exercises got progressively more difficult, the students found them easier to complete because of the learning process.

For the week's classes the IE instructors chose three from among the 20 instruments developed by Feuerstein. They covered Organization of Dots, Comparisons, and Analytic Perception. The Organization of Dots instrument is an example. The task is to identify and outline, within an amorphous cloud of dots, a series of overlapping geometric figures. To complete the exercise successfully the students employed at least five different cognitive functions: visual transportation of the shape, scanning, reference to the model, projection of a relationship among otherwise discrete units, and holding an object constant despite the variations of its characteristics. The exercise demanded precision and accuracy from the students to identify parallel dimensions, distance, and size.

In the early exercises it was apparent that the students had the cognitive problems of lack of planning and proper strategizing, discriminating of task functions, and impulsiveness. In each subsequent

exercise the students showed an improved performance and consciousness in planning, projecting relationships with precision and accuracy, and strategizing properly. Even though the exercises became progressively more complex, the number of mistakes made by the student decreased. This reflects a much more organized attempt by the student to define the task, to act on it, and to evaluate the work. In the American Indian Retention Program the instructors assisted students to bridge to their Indian culture and to their intended engineering careers using exercises especially designed for this project. For instance, one activity was a problem-solving exercise in which students were asked to identify and solve a problem in an Indian community by breaking the whole into parts and analyzing its structural and operational aspects. The students were also asked such questions as "How do you project relationships into seemingly unorganized activities in careers?" or "Where are precision and accuracy required of your performance in academic work?" or "On what occasions is planning necessary in getting a job?"

Five days is a very short period of instruction and can encompass only a small part of a program which is usually taught in daily sessions over two years. However, there was some attempt to measure the influence of the week's activities. The evaluator, Mr. Perry Horse, focused on student feedback as well as his own empirical observations of the program. During the last two days of the week he interviewed each student, and a final activity for the students was to respond to questionnaires rating the IE materials and assessing their own progress in improving their cognitive skills as a result of the IE instruction. A large majority of the students felt that the IE materials were

beneficial. All of the students noted some change in their thinking behavior as a result of the IE instruction.

During the interviews each student was asked to rate himself/herself as a "thinker" on a scale of 1 to 10, 1=low, 10=high. A large majority, 17 out of 21 students, rated themselves between 5 and 10, with a median rating of 7. Some students indicated they would have rated themselves below 5 prior to the seminar; only four students rated themselves below 5 after the week-long session. The majority of the students reported that they found the seminar to be a rewarding, challenging experience.[8]

The instructors evaluated the students' progress through interpretation of the adapted IE materials. The instructors indicated that the students were highly receptive to modification of their thinking habits and skills. They noted particularly the students' improvements in precision and accuracy of thinking, their performance in handling tasks requiring them to manipulate many units of information at the same time (an efficiency of thinking task), their increased abilities to plan and organize, and their increased abilities to draw relationships between ideas and events across various parameters of thinking.[9] One Navajo student summed up his experience visually with symbols. [See Figure 1.] The first square was the student's mind before he started the seminar. In the second he had an idea of the process. In the third the idea

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[8]Horse. pp. 7-8.

[9]Larry Emerson. "Interpretation of I.E. Program at New Mexico State University Freshman Indian Seminar, August 7-12, 1983." Unpublished Manuscript, 1983. NiHa'AlchiniBa Educational Services, Shiprock, NM, p. 3.

became more precise and concentrated. There also were two sides in which to compare the similarities and differences. In the fourth square there was new information to fit into the mind. Finally, the fifth square concluded with an exchange of ideas.

The evaluator of the American Indian Retention Program concluded "that the IE instruction and materials constitute an effective methodology for inducing cognitive development in high achieving young adults. However, further work and analysis are needed in order to confirm this general observation."[12] The program planners enthusiastically concur. Feuerstein has noted that "results of the PMA [Primary Mental Abilities] test suggest that Instrumental Enrichment exercises are particularly effective in improving numerical and figural concepts."[13] This indicates that IE is particularly well suited for cognitive training for those contemplating a technical career.

This summer program was the first of its kind in that it was directed specifically at the retention of Indian students in engineering and science through cognitive skills development. As such, it is a departure from the more conventional approach of academic remediation. However, this abbreviated version of IE instruction was too short to demonstrate the impact that is possible, and a longitudinal study with controls is needed to determine the long-term effects of increasing cognitive modifiability. The NAMEPA Task Force has submitted proposals to continue the project at the secondary school level to the National

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[12] Emerson. pp. 4-5.

[13] Feuerstein, 1980, p. 368.

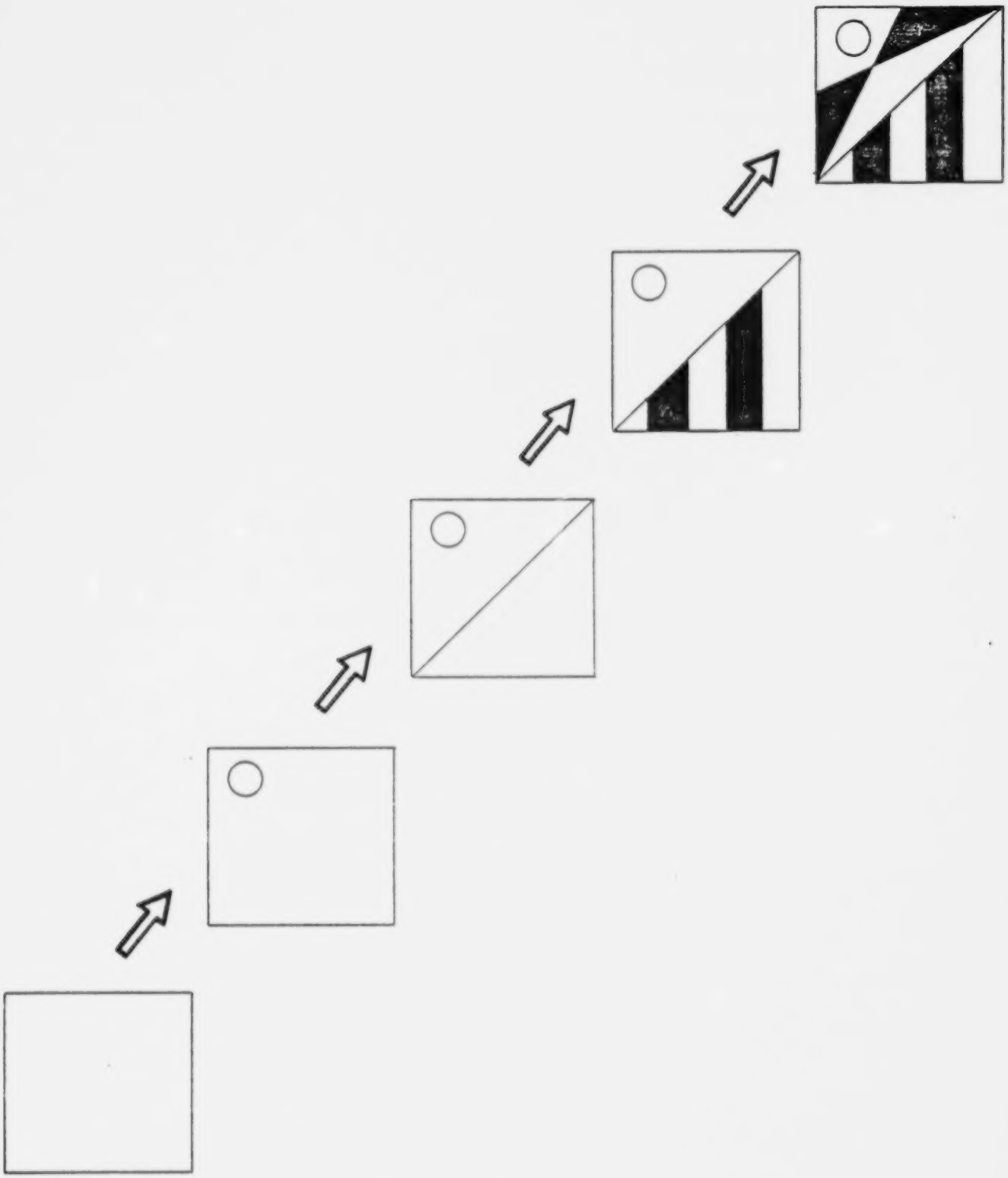

Figure 1

Science Foundation, and at the university level to the Fund for the Improvement of Post Secondary Education. Proposals are also being submitted to private foundations interested in sponsoring new ideas in technical education for minority engineering students.

TEACHING CRITICAL THINKING IN HIGHER EDUCATION

by

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TEACHING CRITICAL THINKING IN HIGHER EDUCATION

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INTRODUCTION

The report of the Study Group on the Conditions of Excellence in American Higher Education states (National Institute of Education, 1984:35): "The Nation has entrusted its system of higher education to extend both the franchise of learning and the frontiers of the universe itself. But our students will find that this great national resource has not realized its full potential." Moreover, according to the report (1984:35): "many Americans are currently undereducated in relation to their potential." Why is it that we are not teaching to potential? Why is it that students are not learning to potential? What are the barriers that prevent us from realizing the full potential of higher education in American society?

While there are many areas of skill development worthy of consideration when evaluating a quality higher education, attention in this paper is specifically directed toward the

skill of critical thinking. In light of skill development generally and with particular focus on critical thinking, the NIE report recommends that postsecondary institutions be less grandiose in their statements of goals and far more specific about their objectives. The report states (1984:43):

> *It is not sufficient that the lists generated by faculty and academic officers recite symbolic terms like "critical thinking," "problem solving," or "creativity." We recognize that not all of the outcomes of an undergraduate education can be specified in such a way as to be easily quantified. But this does not relieve us of the responsibility to define the knowledge, capacities, and skills we expect students to attain. For example, it is fair for a student to ask what we mean by "critical thinking," and it is fair to expect a faculty member to provide a satisfactory, detailed response."*

In this instance, the report is urging institutions of higher learning to make explicit their expectations of students to students, faculty members and the public. One of the more frequently mentioned skills necessary for a liberal education is the need to think critically. The NIE report states (1984:43):

> *Liberal education requirements should be expanded and reinvigorated to insure that (1) curricular content is*

directly addressed not only to subject matter but also to the development of capacities of analysis, problem solving, communication, and synthesis, and (2) students and faculty integrate knowledge from various disciplines.

The report argues that education should prepare the individual to function in a changing world. In addition, that 'adaptation' to change requires the ability to (1984:43): "think critically, to synthesize large quantities of information, and to master the language skills (critical reading, effective composition, clear speech, and careful listening) that are the fuel of thought."

Although critical thinking has been prized from the time of the ancient Greeks, its importance as a needed skill comes and goes with the tide of academic movements. In a social climate of economic constraints, political pressures and academic uncertainty, institutions of higher education are re-evaluating their approaches to education. Not the least of concerns to many institutions is the assessment of modes of learning as they relate to what is considered 'a high quality education.'

During the last few years we have witnessed a growing concern about the critical thinking abilities of the students involved

in higher education. To many observers in higher education, student abilities have seemed deficient--that is, below a standard deemed acceptable and achievable. Students appear, according to many faculty members, to enter with deficient thinking skills and, unfortunately, all too frequently graduate from our colleges and universities without necessary skills.

In addition, the task and responsibility of teaching in institutions of higher learning is frequently complicated and obstructed by the inability of many students to think critically. Deficiencies in basic thinking skills limit learning for students and impede the educational process generally.

Regarding the reality of deficiencies Zelda Gamson (1984) suggests that under the pressure of poorly prepared students and a declining market of prospective college students, faculty and administrators have begun to re-evaluate their educational programs. Gamson states that by the middle of the 1970s inadequately prepared students began to infiltrate selective colleges and universities, causing a debilitating problem. It has taken a while for faculty and administrators to recognize the decline in student academic skills and even longer to begin to do something about it. Blame has been passed from shoulder to shoulder and several studies have confirmed that general

education could be defined as a "disaster area" (Carnegie Foundation for the Advancement of Teaching, 1977). Although few faculty members know what specific skills their students should have, they become acutely aware of 'general' deficiencies in student quality. One obvious clue to the problem is the ever expanding discrepancy between the skills of the most capable and the least capable students. Gamson (1984) observed that few faculty know how to teach "skills." Many feel that teaching "skills" is the job of specialists, while they remain in specialized content areas.

Under a climate of despair, many faculty who once may have been idealistic teachers, find themselves denigrating students. Some faculty drift into a resigned acceptance of low student performance, inflated grades, sugar-coated assignments, and mutual boredom (Gamson, 1984). Other faculty, attempting to cling to and uphold standards of quality that they themselves met, find themselves stigmatized as extremely demanding, rigorous and unreasonable teachers.

There has been, however, a shift in perspective. Faculty members are slowly beginning to accept some responsibility for teaching basic skills--not only in open-door colleges but in others including the most selective as well (Shaughnessy, 1977; Richardson, Martens, and Fisk, 1981). Re-evaluation of

undergraduate education, that began in the 1970s, has re-emerged today. Debates regarding moving back to 'basics' or developing a core curriculum (Levine, 1978) have become common. Questions both of a practical and philosophical nature are discussed. Such as, "what should every educated person know?" "What skills are necessary to become a responsible citizen in a democracy?"

As one listens to educators in Higher Education discuss critical thinking and as one reads about the subject, three impressions become clear. One is that teaching students to think critically is an objective shared by most teachers and is highly valued. The second is that there is not much consensus on what is meant by critical thinking. A third impression is that talk about critical thinking whether it be from the administration, faculty or students, far exceeds our knowledge about it and practice of it. In this case especially, talk is no substitute for action. Overall, it appears little is done directly in the classroom to improve students skills in critical thinking.

This paper will address the skills identified with critical thinking, deficiencies in thinking skills, and present recommendations for implementing critical thinking skills in higher education.

There are two dominant concepts of critical thinking held by educators. Educators have frequently defined critical thinking as a problem-solving process. This approach, most frequently associated with John Dewey (1933), is viewed as the discovery method. Dewey suggested that (1933:75): "actual thinking has its own logic, it is orderly, reasonable, reflective." Here the key for Dewey is the term 'reflective.' Coining the term "reflective thinking," Dewey identified five phases of this cognitive process (1933:107):

> *(1) suggestions, in which the mind leaps forward to a possible solution;*
>
> *(2) an intellectualization of the difficulty or perplexity that has been felt (directly experienced) into a problem to be solved, a question for which the answer must be sought;*
>
> *(3) the use of one suggestion after another as a leading idea, of hypothesis to initiate and guide observation and other operations in collection of factual material;*
>
> *(4) the mental elaboration of the idea of supposition (reasoning, in the sense in which reasoning is a part, not the whole, of inference); and*
>
> *(5) testing the hypothesis by overt or imaginative action.*

For Dewey, these five phases are not fixed sequentially therefore different problems will involve different patterns and contributions from these characteristics. Dewey's model has inspired and guided college teachers in their efforts to implement critical thinking in general education. The emphasis for Dewey is clear, critical thinking is a cognitive process that is closely aligned with the problem-solving process.

A second concept of critical thinking, other than the cognitive, problem-solving approach, holds that critical thinking is best identified as a form of logical analysis that results in evaluation. Max Black's influence is most significant in this area (1952). Supporters of this approach see critical thinking represented by such topics as deductive logic, induction, and language usage. Undoubtedly the most widely recognized development of this orientation is seen in the work of Robert Ennis. Ennis originally (1962:84) noted twelve aspects of critical thinking:

(1) Grasping the meaning of a statement:

Judging whether:

(2) there is ambiguity in a line of reasoning

(3) certain statements contradict each other

(4) a conclusion follows necessarily

(5) a statement is specific enough

(6) a statement is actually the application of a certain principle

(7) an observation statement is reliable

(8) an inductive conclusion is warranted

(9) the problem has been identified

(10) something is an assumption

(11) a definition is adequate

(12) a statement made by an alleged authority is acceptable.

While this list is not exhaustive, it does point the direction toward sophisticated thinking. In logical an alysis, critical thinking is the correct assessing of statement, or correct evaluation.

Ennis' interpretation of critical thinking has been refined over the past twenty years. Ennis (1979:5-6) outlines characteristics of rational thinkers as persons who:

A. are proficient at:

(1) observing,

(2) inferring an explanation, the point, the meaning, and so forth,

(3) generalizing,

(4) conceiving and stating assumptions, alternatives, plans, predictions, definitions, and so forth,

(5) offering a well-organized and well-formulated line of reasoning,

(6) evaluating authoritative-sounding statements, deductive reasoning, inductive reasoning, explanations, value statements, and definitions,

(7) detecting standard problems and realizing appropriate action; and

B. have the tendency to:

(1) exercise the proficiency they possess,

(2) take into account the total situation,

(3) be well-informed,

(4) demand as much precision as the subject matter permits,

(5) deal with the parts of a complex situation in an orderly fashion,

(6) consider seriously other points of view than one's own,

(7) withhold judgment when the evidence and/or reasons are insufficient,

(8) take a position (and change the position) when the evidence and reasons are sufficient to warrant so doing, and

(9) accept the necessity of exercising informed judgments; and

C. exercise good judgment.

With the criteria of critical thinking stated above, one can see that for Ennis critical thinkers not only practice specific, technical, micro-logical skills but also demonstrate certain qualities of character and attitude.. In this view, critical thinkers are active, assertive participants in everyday reality.

The perspective advanced by Ennis extends the earlier work of Watson and Glaser (1964). Watson and Glaser share the perspective that critical thinking is a composite of attitudes, knowledge and skills. More expressly, attitudes of inquiry are accompanied by knowledge (e.g. rcognition of inferences, generalizations, abstractions, etc.) and integrated with skills in employing and applying the attitudes and knowledge. In this way, critical thinking enables the individual to assimilate, process and evaluate ideas.

Expanding this orientation of critical thinking one step further, Richard Paul (1984) suggests two distinct concepts of critical thinking skills: weak sense and strong sense skills. Weak sense critical thinking skills are viewed as (1984:5) "discrete micro-logical skills ultimately extrinsic to the character of the person; skills that can be tacked onto other learning." Strong sense critical thinking skills, on the other hand, are understood as "a set of integrated, macro-logical skills ultimately intrinsic to the charcacter of th person and to insight into one's own cognitive and affective processes." Paul argues that true teaching of critical thinking involves both sets of skills. Moreover, he holds the position that while short-term strategies may be beneficial in giving attention to micro-logical, analytic critical thinking skills, long-term strategies will depend more upon macro-logical skills. Ideally, for Paul, the teaching of critical thinking

would include an integration and dialectical working of both sets of skills.

From the theorists reviewed above it is clear that there are two distinct concepts of critical thinking (problem-solving and logical analysis) and two levels of skills (weak sense, micro-logical and strong sense, macro-logical). If one is to teach critical thinking according to these guidelines, specific skills would be taught (e.g. observing, generalizing, evaluating, etc.) as well as an attempt to develop a certain quality of character and attitude. The quality of character and attitude implied if not explicitly stated for these theorists, is represented by a self-concept that accompanies the micro-logical skill development. This self-concept of a critical thinker is exemplified through such qualities self-confidence, self-reflection, self-consciousness and self-assertion. In addition, qualities such as intellectual openness, capable listening, inquisitiveness, an ability to recognize another's point of view and a willingness to participate in learning would be nurtured.

To illustrate these points, reference can be made to the process of asking questions in an educational setting. One particular view of critical thinking emphasizes the process of 'higher cognitive questioning' (Newton, 1978). Theorists of this perspective attempt to stimulate thinking through the use

of questions (Burton, 1929, 1960; Taba, 1967). There is little doubt that most educators would be pleased by a situation in which students were posing significant questions. Enhanced skills in critical thinking would aid this process in the following manner. Micro-logical skills would be necessary to form, in the cognition of students, reasonable and appropriate questions. In other words, is a statement incomplete, illogical, contradictory, tautological, etc., and therefore unacceptable? In addition to exibiting the cognitive ability to arrive at questions, it would be necessary for students to be listening to the statement, to be motivated to question, to have the disposition to inquire further, to know how to pose questions and to follow through by doing so. In this sense, critical thinking would include a certain quality of character and attitude for participating students. Inevitably, here the concern is not only with the ability to ask questions but also the educational context within which questions can be asked. Together, the micro-logical skills, the quality of character and a receptive educational environment work to foster critical thinking through questioning.

DEFICIENCIES IN CRITICAL THINKING SKILLS

While many academicians share the educational goals that students should be able to think clearly, read critically, speak effectively, and participate competently, the reality of

student capabilities generally falls far short of these objectives. As the National Institute of Education report (1984) has stated, "Many American are currently undereducated." Deficiencies in thinking skills represent one important area of 'undereducation.' But what, specifically, are deficiencies in thinking skills?

Any failure in utilizing mental potential that is expected within a certain environment may be considered a deficiency in thinking. To be deficient is to be below a standard deemed acceptable and achievable within a particular context. The NIE report, results from standardized tests (SAT, ACT, GRE), institutionally conducted testing and faculty testing all reveal critical thinking deficiencies in the student population. As the definition of deficiency implies, two possible ways of overcoming deficiencies are to either lower standards or increase the skills learned. Obviously, most academics support the latter option. Educators prefer to improve the critical thinking capabilities of their students, rather than to lower their standards. The key, then, is how to improve the critical thinking skills for a large number of students.

One of the steps necessary to overcome deficiencies in critical thinking is first to be able to recognize deficiencies when they exist. Micro-logical thinking deficiencies may be considered those of a cognitive nature. The inability

to detect a problem, define a situation, formulate hypotheses, question an assumption, analyze a situation, recognize a contradiction, integrate ideas, draw a conclusion, infer an explanation, and/or consider alternative possibilities are all examples of micro-logical thinking deficiencies.

At the macro-logical level of deficiencies (Paul, 1984), students may be intolerant, unreflective, unmotivated, incapable of listening, unable to assume other points of view, and/or non-inquisitive. They may be egocentric and/or sociocentric (Paul, 1984). A narrowmindedness prevails, frequently academic content becomes reduced to a personal interpretation absent of a social consciousness. Deficiencies at the macro-logical level may also include attitudinal factors. A depreciation of edcuation, low motivation, and a strict non-participatory stance may be demonstrated. Obviously, the combination of limited technical thinking skills at the micro level accompanied by deficient quality of character at the macro level forms a reality that makes high quality learning and teaching extremely difficult.

In addition to the deficiencies mentioned, consideration should be given to the contextual environment of education. Deficiencies in critical thinking skills are often perpetuated by structural factors such as large class sizes and high

teaching loads. In certain situations faculty may work in an educational context that places a high value for professional development and relatively low actual (rewarded) value on teaching. Moreover, many faculty may find that their educational training did not adequately prepare them to recognize and test thinking skills or deficiencies in thinking. Likewise, their educational background may not have included knowledge regarding the teaching of critical thinking skills. In short, even if faculty recognize a problem with thinking skills, they may feel illequiped to deal with the problem.

Recognition of the importance of critical thinking skills and an awareness of deficiencies in such skills has also been expressed by prospective employers of college graduates. Watts and Johnson (1984) asked employers what types of college skills they expect a graduate to have gained from a college education. Their findings indicate that (1984:190): "the most frequently expected skills were writing (80.9%), initiative (69.9%) and critical thinking (69.4%). According to Watts and Johnson (1984:199) employers "want students who can think critically about the practical issues that face an industry or business." Deficiencies in critical thinking appear to impede the functioning and improvement of business.

One final point of recognition is important when discussing deficiencies in critical thinking. Many educators still hold to

the idea that critical thinking is learned automatically when certain subjects (mostly social sciences and math) are studied, and therefore it need not be formally considered. Glaser's pioneering literature (1941:69-70) is still the best response to this point of view:

> *There is no evidence that students acquire skill in critical thinking as a necessary by-product of the study of any given subject. On the other hand, almost any subject or project can be so taught as to put pupils on guard against hasty generalizations, contradictory assertions, and uncritical acceptance of authority. In general the research indicates that if the objective is to develop in pupils an attitude of "reasonableness" and regard for the weight of evidence and to develop ability to think critically about controversial problems, then the component attitudes and abilities involved in thinking critically about such problems must be set up as definite goals of instruction.*

Over forty years has passed since Glaser's original statements and yet the report from the National Institute of Education is highlighting identical concerns in higher education. Both Glaser's work and the NIE report call for specific attention to be directed toward deficiencies in

thinking and the prospect of teaching critical thinking skills.

When considering the quality of higher education today and when pointing toward the future, deficiencies in critical thinking deserve attention. Responsibility for deficiencies in critical thinking rests on the shoulders of students who must overcome thinking deficiencies, faculty who must re-evaluate their courses in light of critical thinking, and administrators who must encourage both a structure and process for critical thinking.

RECOMMENDATIONS FOR IMPLEMENTING CRITICAL THINKING IN HIGHER EDUCATION

There are numerous methods that could be employed to improve the learning and teaching of critical thinking skills in higher education. One of the most important steps would be to sophisticate the data (student outcomes) indicating student skills and deficiencies. In this regard the NIE report states (1984:45): "Faculty and academic deans should design and implement a systematic program to assess the knowledge, capacities, and skills developed in students by academic and cocurricular programs." Adequate measures of thinking skills for students upon entering higher education, during their education and at the conclusion of their education are

essential if we are to work toward improving student performance and the quality of education generally.

A specific recommendation is to effectively employ computer technology in improving the critical thinking of students. Computer technology may be utilized to teach micro-logical thinking skills, to foster student participation in learning, to collect data on student performance and to create programs that challenge and advance thinking skills. In addition to the prospect of the computer teaching critical thinking, it is equally reasonable to expect that critical thinking could be used to scrutinize the computer as a relatively recent social and technological phenomenon.

In line with the NIE report (1984), liberal education requirements should be expanded and reinvigorated to include not only the learning of subject matter but also the capacity of critical thinking. Learning the skills of critical thinking provides students with the technical tools necessary and the character required to function in a rapidly changing society.

The NIE report (1984) as well as numerous other commentaries have voiced the opinion that we should expect more from our students. Increasing standards of performance for students, providing means for overcoming deficiences in thinking and sophisticating critical thinking skills are all important

considerations if we are to improve the quality of higher education.

Institutions of higher education should establish opportunities for both faculty and students to increase their knowledge of critical thinking. Courses, workshops, computer training, exercises, instruments, and references should all be made available for use. It would be beneficial for faculty to identify the critical thinking that is going on presently in their classes and seek means of advancing the teaching and learning of critical thinking in their courses.

Faculty should consider developing specific methods to facilitate the teaching of micro-logical critical thinking skills within their established subject areas. Educators may find a fresh look at their courses to be advantageous for improving the structure and process of their classes.

Faculty may be encouraged to participate in critical thinking as it relates to their discipline. The professional advancement of "theory" and "research" on critical thinking has relevance for most if not all disciplines. Critical thinking as an area of study would benefit from educators in various disciplines relating critical thinking to their subject matter. In addition, educators would benefit by sharing ideas, methods, data and literature relevant to critical thinking.

Administrators, faculty members and students should work to establish educational structures that encourage critical thinking. Students should be rewarded for their demonstration of critical thinking skills, faculty should be rewarded for their efforts to teach critical thinking, and administrators should be rewarded for their leadership in providing structures and incentives that enables critical thinking to flourish.

Perhaps the most important recommendation that can be suggested is for those concerned about higher education and its future to recognize and appreciate the skill of critical thinking and to begin to play a part in advancing its contribution to education. When more educators take part in this endeavor, then we will have moved one step closer to realizing the full potential of higher education in American society.

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WORKING WITH NON-TRADITIONAL STUDENTS:

WOMEN IN TRANSITION

by

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INTRODUCTION

Colleges and universities have long been considered institutions for youth. They are viewed as logical extensions of the progression from grade school to junior high school, from high school to college. As all inclusive as this progression sounds, many students are left stranded by the side of the road. The educational process loses students at almost every major intersection. Some drop out between junior high and high school and some finish high school and do not seek further education for reasons ranging from personal burnout to financial hardships. Others are fortunate enough to continue through college and may even seek post-graduate degrees. A rising phenomenon of our current educational process is that many who drop out seek re-entry later in their lives, returning to the system with added age, maturity, experiences--and greater expectations. Often these re-entry students are viewed, both by traditional students and faculty, as highly exceptional intruders on the domain of youth. Many institutions and educators have looked on this population and its educational requirements as marginal activity. Adults do not always fit easily or comfortably into this youth-oriented world. Colleges and universities seem to have an equally difficult adjustment when these adults become students.

Adults who do not have degrees are returning to the campus in record numbers in search of more education. (Carnegie Report, 1981) Nationally, over one-third of all students taking college credit-bearing courses are over the age of 25 (Margarrel, 1981). Slightly more than 52% of all college undergraduate students (of whatever age) are now women. (Hodgkinson, 1983) Yet, it has been estimated that only fourteen percent of Americans over the age of 25 have college degrees, making this a largely untapped market for future growth for colleges and universities as they are facing the realities of a stable or perhaps even a decreasing traditional aged population.

Ernest Boyer (1981) of the Carnegie Foundation for the Advancement of Teaching indicates that for as far into the future as can be projected, the shape of American education is going to reflect older students' participation. He believes that this is perhaps the most significant shift in college population forecast since the baby boom expansion of the 1960's and that the impact of this new movement of older students is just beginning to be felt. (Carnegie Report, 1981)

WHO IS RETURNING AND WHY THEY RETURN

When viewing this adult student body, one must consider the population and its educational needs as a group. Just as with traditional students, many adults' needs are similar and require common responsive measures. Although re-entry students come from a variety of ethnic backgrounds, financial abilities, and educational histories, they share many of the common problems of re-entry. This process can mean a disruption of former lifestyles and new, unfamiliar, challenging experiences that may bring with them emotional as well as educational perplexities.

Studies suggest that between one-in-three and one-in-five adults are currently involved in educational pursuits of one type or another. (Axford, 1980; Cross, 1982; Harrington, 1977; Heppner, 1982; Title, 1982) There seem to be several common indicators characteristic of adults engaging in re-entry learning.

I. PAST LEVEL OF EDUCATIONAL ATTAINMENT

Cross (1980) suggests that the past level of educational attainment may well be the single most important predicator of whether or not a person seeks re-entry. According to Cross, individuals who have graduated from high school will find themselves four times more likely to become involved in higher education than non-high school graduates. Future implications for colleges and universities are revealed in the projection that the general population of the United States is becoming better educated with each passing generation. The average adult over the age of 25 in 1980 had 12.3 years of schooling as compared with 9.3 years just one generation ago. (Gross, 1982; Golladay, 1976) Thus, it would seem that the rising educational attainment of the general population may well result in an increased demand for more learning activities by older students. The real numbers of adults seeking admission to universities and colleges also seems to project this trend. (See Table I)

TABLE I

Projections Show Increase in Enrollment of Older Students by 1990

Age group	Estimated enrollment in 1970	Proportion of population in 1970	Projected population in 1990	Projected enrollment in 1990	5-year change
14 through 17	311,000	1.9%	12,770,000	243,000	- 68,000
18 and 19	2,844,000	34.6%	7,195,000	2,489,000	-355,000
20 and 21	2,353,000	29.1%	7,311,000	2,128,000	-255,000
22 through 24	1,794,000	15.4%	10,641,000	1,638,000	-155,000
Total, 14 through 24	7,302,000	10.6%	37,917,000	6,499,000	-803,000
25 through 29	1,679,000	9.3%	20,169,000	1,876,000	+197,000
30 through 34	996,000	6.1%	20,917,000	1,276,000	+280,000
35 through 39	566,000	4.2%	19,261,000	809,000	+243,000
40 through 44	330,000	2.9%	17,331,000	503,000	+173,000
45 through 49	223,000	2.0%	13,889,000	278,000	+ 55,000
50 through 54	139,000	1.2%	11,442,000	137,000	- 2,000
55 through 64	111,000	0.5%	20,776,000	104,000	- 7,000
Total, 25 through 64	4,044,000	3.2%	123,785,000	4,983,000	+939,000
Total, 14 through 64	11,346,000	7.7%	161,682,000	11,482,000	+136,000

Source: The Chronicle of Higher Education, May 4, 1981

These projected enrollment trends of older students become even more significant when viewed alongside the historical projection of five-year enrollment trends of older students. (See Tables I and II)

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TABLE II

5-Year Enrollment Trends Among Older Students

Population aged 25 through 34

	1979			Change from 1974		
	Men	Women	Total	Men	Women	Total
Total	16,715,000	17,674,000	34,389,000	+18.3%	+17.2%	+17.7%
In college	1,356,000	1,319,000	2,675,000	- 1.1%	+58.7%	+21.5%
Full time	558,000	364,000	920,000	- 0.7%	+41.6%	+12.5%
Part time	798,000	955,000	1,755,000	- 1.4%	+66.4%	+26.8%
Freshmen	160,000	281,000	441,000	-15.8%	+59.7%	+20.5%
Sophomores	193,000	212,000	405,000	-18.2%	+86.0%	+15.7%
Juniors	203,000	146,000	349,000	+19.4%	+43.1%	+28.3%
Seniors	193,000	138,000	331,000	- 7.7%	+84.0%	+16.5%
Graduates	606,000	543,000	1,149,000	+ 6.9%	+48.8%	+23.3%
2-year colleges	288,000	375,000	664,000	-16.5%	+70.5%	+17.5%
Full time	102,000	81,000	185,000	+ 3.0%	+52.8%	+21.7%
Part time	186,000	294,000	479,000	-24.4%	+76.0%	+16.0%
4-year colleges	460,000	402,000	862,000	0.0%	+62.8%	+21.9%
Full time	203,000	136,000	340,000	-14.0%	+33.3%	+ 1.2%
Part time	257,000	266,000	522,000	+14.7%	+83.4%	+40.7%

Population aged 35 and over

	1979			Change from 1974		
	Men	Women	Total	Men	Women	Total
Total	42,437,000	49,427,000	91,864,000	+ 6.5%	+ 6.6%	+ 6.6%
In college	487,000	914,000	1,402,000	+ 2.3%	+66.8%	+36.8%
Full time*	81,000	147,000	228,000	-22.9%	+42.7%	+ 9.1%
Part time*	402,000	764,000	1,166,000	+ 9.2%	+72.5%	+43.8%

*Full-time or part-time status was not indicated by 0.6 per cent of the students.

Source: The Chronicle of Higher Education, May 4, 1981

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II. THE CHANGING ROLE OF WOMEN IN OUR SOCIETY

Women are returning to education as an increasing force and in ever-increasing numbers. One of the fastest growing student groups on college and university campuses are women 35 and over. (Cross, 1980; Naisbitt, 1982) In 1972, 418,000 women in this age group were in college. By 1976 this figure had grown to 700,000 an increase of 67%. This growth has continued at an increasing rate of participation. During the same period the enrollment of male students 35 and older grew from 365,000 to 489,000--an increase of only 34 percent. (Feeney, 1972; Apps, 1980) Between the years 1969 and 1975 the number of adult women learners has increased by 45 percent as compared to an 18 percent increase for men. (Cross, 1980) Naisbitt's Megatrends (1982) calls this new role for women the "option explosion" and he projects that the new options have significant implications for colleges and universities simply because of the projected numbers. There are now more women in college and graduate schools than men and the majority of these "new" college women are over the age of 35. This significant increase for female participants is due to a number of factors.

Historically there has been a continually increasing participation rate for women in education. A review by Feeney (1972) shows that, although progress has been continuous, it has been sometimes slow, and is still influenced by many of the same cultural and personal barriers that seem to have existed previously. According to Feeney, a complex set of social and personal forces bring women back to education:

1. Increased prosperity of the general population.
2. A re-evaluation of women's educational needs.
3. Expanding leisure time especially among middle-aged and elderly women.
4. Civil Rights Issues and the institutional need to comply with the law in admitting more women.
5. Women's need for education for teaching and technical jobs.
6. Higher status of women leading to social acceptability of women enhancing their knowledge.
7. Acceptance of modern psychological theories leading to self actualization through education.
8. Changing life patterns of women especially when considering the higher divorce rate and current trends of re-entry into the workplace and/or school.
9. Increased emphasis on the need for continuing education owing to the expansion of knowledge.
10. Enjoyment of learning.
11. Desire for professional growth.
12. Feelings of discontent and the need for change.
13. Sense of inadequacy with previous levels of education.
14. Changing aspirations of women themselves.

One or all of these factors may be involved in the decision to re-enter. But Feeney suggests that women are primarily returning in large measure because the women's movement has granted acceptability for women to become re-involved in education.

There are several characteristics of returning women students that are important for administrators and those in policy-making position. Age is certainly one of the most important characteristics for re-entry women, but others that may be equally important are marital status, number and ages of children, length of time since the last educational or work experience, and personal statements concerning the reasons for returning to higher education. Title and Denker (1980) suggest there are several factors which also act as preventative forces for mature women re-entering the educational system. These barriers have been categorized as institutional, situational, and dispositional.

Institutional factors that have excluded women from post-secondary education include sex and age quotas, financial aid practices, regulations, deficiencies in curriculum planning, insufficient student personnel services, and faculty and staff attitudes. The more serious institutional barriers are in the form of discrimination against part-time students and a virtual lack of financial support for the part-time student. Institutional practices concerning course offerings may make little or no effort at becoming flexible, i.e., there seem to be few attempts to systematically examine scheduling and course cycles over time in order to provide availability for the part-time student. Time limits on course or degree requirements are often a hindrance to the returning part-time student as are the schedules and the locations of the courses. Most typically. institutions may limit access to resources and support facilities for part-time students. This is particularly true of evening students. Offices of counseling, career planning and placement, advisement, financial aid, book stores, and some libraries are often open at hours scheduled for staff, rather than for student, convenience. (Title and Denker, 1980)

Situational or social barriers are those likely to arise from the social class and ethnic or racial group to which the returning woman belongs. Fewer women from lower socioeconomic groups are likely to participate in post-secondary education. (Cross, 1980) With the exception of black women, the college attendance rate of minority women is under that of males of all ethnic groups and of white females. There seems to be lower expectations for women, in general, and for women of minority groups specifically, to continue their educations. (Title and Denker, 1980)

III. THE CHANGING RACIAL AND ETHNIC DEMOGRAPHY OF HIGHER EDUCATION

Hodgkinson (1983) overviews the demography of students in the 1980's and 1990's. Birthrates in the U.S. remained a "Baby Boom" high between 1946 and 1964 followed by a period of decline then rough stability or gentle incline after 1979. The "Baby Boom" age cohorts are now adults who are producing another demographic crest by 1998 with their own offspring and are themselves becoming the new generations of re-entry students.

While this fairly describes the national trend, it masks very distinct differences between various demographic sectors. The birth rate decline since 1964 was primarily among the white, middle class while birth rates for most minority groups remained constant, resulting in increased percentages of minorities among birth cohorts. As Table III indicates, these minority cohorts are heavily enrolling in the public schools, the educational institution for approximately 90% of the nation's elementary and secondary students. (Hodgkinson, 1983) It is in higher education's best interests, then, to assure that increasing high school attrition is reversed and that these minority students do well in public school and thus become college eligible especially in states with high minority enrollments. And, since 90% of the 1990 work force is at work today, the 10% added should represent a higher proportion of minority youth if they are educationally prepared to compete alongside their white peers. By 1990, minorities of all ages will constitute 20-25% of the total population, while their percentage among the youth cohorts will be over 30%. (Hodgkinson, 1983) This pattern is unfolding even faster in the sunbelt states where the numbers of high school graduates is already stabilizing or increasing due both to increases in fertility and immigration.

By 1990, it is anticipated that 19% of Americans will live in the West and 31% in the South as the population continues to shift to these areas creating very different problems for the expanding Sun Belt institutions in contrast to the declining Frost Belt institutions. Still, significant differences between minority groups exist. Currently, 28% of all black youth between 18 and 24 enter college but Hispanics enter at a rate between 5-15% for the same cohort. However, in contrast to previous generations of Hispanics, only 65% of 5-17 year old Hispanics speak Spanish and all but 16% speak English making these growing cohorts more likely to acquire sufficient bilingual skills to compete in English speaking college campuses. (Hodgkinson, 1983) Yet, there are regional differences among the various Hispanic subpopulations which may require different strategies of institutional response for each subgroup.

TABLE III

MINORITY PUBLIC SCHOOL ENROLLMENT
FALL 1980

State and Region	% of Total Enrollment	State and Region	% of Total Enrollment
United States	26.7	*Southeast*	
		Alabama	33.6
New England		Arkansas	23.5
Connecticut	17.0	Florida	32.2
Maine	0.9	Georgia	34.3
Massachusetts	10.7	Kentucky	9.1
New Hampshire	1.3	Louisiana	43.4
Rhode Island	8.2	Mississippi	51.6
Vermont	1.0	North Carolina	31.9
		South Carolina	43.5
Mideast		Tennessee	24.5
Delaware	28.8	Virginia	27.5
District of Col	96.4	West Virginia	4.3
Maryland	33.5		
New Jersey	28.4	*Southwest*	
New York	32.0	Arizona	33.7
Pennsylvania	14.9	New Mexico	57.0
		Oklahoma	20.8
Great Lakes		Texas	45.9
Illinois	28.6		
Indiana	12.0	*Rocky Mountain*	
Michigan	21.3	Colorado	22.1
Ohio	14.7	Idaho	8.2
Wisconsin	9.3	Montana	12.1
		Utah	7.3
Plains		Wyoming	7.5
Iowa	4.1		
Kansas	12.7	*Far West*	
Minnesota	5.9	California	42.9
Missouri	14.8	Nevada	18.9
Nebraska	10.5	Oregon	8.5
North Dakota	3.5	Washington	14.1
South Dakota	7.9	Alaska	28.4
		Hawaii	75.2

SOURCE. These data were presented at a conference sponsored by the Institute for Educational Leadership, November, 1982. (Hodgkinson, 1983)

IV. THE PROCESS OF ACTIVELY RECRUITING ADULT LEARNERS

More and more universities seem to be becoming aware that the adult age group has the largest potential for growth in the 1980's and beyond, possibly into the year 2000. (See Table I)) Some changes in methods would seem appropriate for colleges to meet the needs of this group of adult learners. Since the early 70's it has become somewhat easier for the re-entry student, who must work days, for example, to get a degree. Many colleges that previously offered only non-credit, continuing-education courses have developed a full night curriculum. Other schools with limited

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programs have expanded them. Most would indicate the reason is at least partly economic.

Colleges and universities are discovering the power of actively advertising for this population. Directed, specific recruitment seems to meet the needs of a population in search of retraining and may also help universities face the realities of a now stable or decreasing traditional population pool.

Universities and colleges are using newspapers, television, and radio advertisements in an attempt to reach and attract from this population. This seems to be particularly true of community colleges and colleges that have been designed specifically to meet the needs of this age group, such as City University, Antioch College, British Open University and the University of Mid-America.

The scheduling of more and more classes during the evening hours and at places and times more convenient to an older, off-campus population speaks to an awareness of the need to make education more accessible to this group. Ferguson (1980) suggests that for too long schools have been entrenched bureaucracies whose practitioners have not had to compete for business nor have they had to stand for reelection or "attract patients, customers or clients." According to Ferguson, in an era of decreasing traditional population, the ability to recruit and attract new and different populations may be the most dynamic area for growth and, indeed, even obligatory for institutional survival.

There is some criticism of the process of active, aggressive recruitment of adult learners. Traditional educators seem to believe that the recruitment of adults into traditional educational programs will result ultimately in the spread of lockstep schooling and the development of an over-credentialed society. Another reoccuring criticism is that in their eagerness to recruit adult learners, universities are engaging in "academic hucksterism" and the selling of credentials through liberal policies of conferring credits which compromise academic standards. There is also a growing suspicion that colleges are more interested in meeting their own needs for survival by the recruitment of adults than in serving the learning needs of the adult student once they have been recruited. (Cross, 1982) Universities will have to face critical examination of their individual recruitment programs to insure that these programs are not solely aimed at promoting the survival of the institution, but at the improvement of adult learning opportunities.

The recruitment of adult students is occurring not only by colleges and univsities who currently are attracting about 12 million people, or 1/4 of adult learners. The other 3/4 or 46 million adults are being educated by such diverse sponsors as union colleges, corporation training schools, the military and the U.S. Department of Agriculture. (Hodgkinson, 1983) Colleges and universities could and perhaps

should attempt recovery of some of these 46 million people into their institutions and reverse the growth of this "second system" of postsecondary education.

Adding to the recruitment strategy will need to be a growing recognition of the marital, parental and occupational histories of prospective students. While in 1950, 65% of the households had a working father, homemaker mother, and two or more school age children, that description currently only fits 17% of households, reflecting both higher divorce rates and higher work force participation rates for women. (Hodgkinson, 1983) Almost half of all children being born in the 1980's will be raised by a single parent for at least part of their lives. The exact influence of these demographic trends is unknown but these younger cohorts may not be an intensely home educated by parents who are busy working and possibly being students themselves which may influence their attitude and preparation for college work in the future. In addition, the rapid growth of adults 65 and older creates an additional market if their educational needs and financial means can be effectively determined and met by educational institutions.

SOCIOECONOMIC STATUS OF ADULT LEARNERS

The history of our changing population structure yields evidence as to who is and will be available for re-entry education. Apps (1980) has compiled statistics that show the implications for education of this changing structure of the adult population. The median age of the United States population is slowly creeping higher. In 1975 it was 28.8; in 1980, the median age was 30.2; and in 1990 it is projected at 32.8. The number of people in the 24-and-younger age group is declining and those in the 26-64 age groups are increasing. In 1975, 93.9 million people were 24 or younger; by 1990 predictions indicate a drop to 89.9 million in this age group. In 1975, 97.3 million people were 25-64. Predictions for 1990 show 123.8 million in this age group with an added increase for those over 65 from 22.4 million to 29.8 million. (Apps, 1980)

There are some disturbing characteristics to be found in the overall socio-economic status of adult involvement in higher education. Adult education, from all reported trends, appears to be elitist and is getting more so. As a group, today's adult learners are disproportionately white, well-educated and make good salaries. Certain populations are significantly under-represented in organized learning activities for adults: racial minorities, including blacks; people with

less than a high school education; those whose annual family income is under $8,000; people 45 and older; and those living in the central cities or on farms. (Cross, 1980)

The greatest increase in education participation between 1969-1975 was by white women with a college degree and family incomes of $25,000 or more. (Cross, 1980) The rate of growth for women is double the rate of growth for men, the rate of participation for college graduates is twice that of high school graduates and the participation of whites has increased eight times in proportion to blacks and other minorities.

INSTITUTIONAL RESPONSES

Hardly a college or university has failed to feel the impact of adults returning to campus and few have failed to adapt in some way to this new, older student on campus. The nature and the types of adaptations, however, vary from campus to campus and are tied to a complex series of pressures applied as the campus slowly takes on a delightful shade of grey. Ackell (1982) has defined three stages of adaptation:

STAGE ONE:

The Laissez-Faire Stage - This stage is characterized by a simple removal of any barriers or artificial constraints on adults. (i.e.. age requirements, parental consent forms, sex or racial requirements, and an easing of the requirements of years in and out of college.)

This system allows adults access to do the best they can within a system that works neither for nor against them. Adults are allowed to be as entrepreneurial and aggressive as they wish in dealing with the institution, according to Ackell. In the Laissez-Faire stage institutions tend to lack provisions for adult students, i.e.,

--No active recruitment
--No special support services
--No curriculum development efforts especially for adults
--No faculty development efforts for dealing with adults

Ackell suggests that there is an overall institutional assumption that student problems are intrinsic to their role as students, not their age, maturity, and/or experiences.

STAGE TWO:

The Separatist Stage in which institutions, when faced with an increased and increasing enrollment of adult students, soon realize that age is relevant to student needs. Adults are essentially segregated from the major student body and given separate specially developed programs, usually at different times and locations from the traditional student body and often with a lack of effective

Ackell suggests that these programs are also given a priority and status demonstrably lower than those of traditional programs. Adults become exploited economically and sometimes educationally as well. Fees are not adjusted, the services are weak, if available at all, and there is usually substantially less general fund support than that given to programs for younger students. Other characteristics of this stage include:

--A clearly segregated and identified adult or evening program.
--A separate or part-time faculty for this evening unit consisting primarily of adjunct or part-time faculty and some regular faculty.
--Limited or tightly controlled opportunities for evening students to take day classes and for day students to take evening classes.
--Different programs and degree requirements for day or regular programs and evening or adult programs.
--Separated and different services for adults.
--Limited noninstructional student services for adults.
--Low status for administrators of adult programs granting them limited or no access to university policy-making processes.

STAGE THREE:

The Equity Stage has characteristics are the following:

--Active recruitment of adult students.
--Appropriate delivery systems for adult learning.
--Fully integrated curriculum.
--Fully integrated faculty.
--Provisions for degree credits for prior learning.
--Administrative service made available by phone, mail, during the evening, and on weekends.
--Academic advising available at hours adults are on campus.
--Personal counseling, financial advising, career counseling, and other student support services available in the evening and responsive to adult problems.
--Senior policy-making bodies of the university aware of adult students.
--Fully empowered adult administrators.
--Administrative policy and practice that is proactive rather than reactive in dealing with adult students, their needs, and their problems.

A TYPOLOGY OF STUDENTS

Carole Kaswon (1980) developed a typology which helps to show the different characteristics and needs of the adult as compared to the younger student. (See Table III.) The development of the typology was undertaken because she felt that higher education has not sufficiently acknowledged adult education in its mission, curriculum, or instruction. This composite typology of adult students as compared to younger students provides many basic, key differences that the personnel of colleges and universities should be aware of in order both to respond to the needs of and appreciate the differences between adults and younger students. However, it would seem important to acknowledge that some

of the characteristics mentioned by Kaswon cross the boundaries she establishes for traditional and non-traditional students. Age does not always establish the boundaries of dependence and independence in terms of emotion, time focus, confidence, orientation, or decision making. This typology is best used as a general tool. There would seem to be areas of cross boundary competency and/or lack of competency in both younger and older students. The strong point of the typology is the potential for differences.

TABLE IV STUDENT TYPOLOGY (Kaswon, 1980)

YOUNGER STUDENTS	OLDER STUDENTS
1. Quasi-dependent beings	1. Independent beings
2. Limited emotional/financial support for significant others.	2. Major emotional/financial support for significant others.
3. Major time focus on academic and related extra-curricular activities.	3. Competing time focus on job, family, community, personal responsibility, in relation to academic activity.
4. High identification with student role.	4. Composite identification with many roles.
5. Seeking out self-identity.	5. Renewing self-identity.
6. Limited awareness of own capabilities.	6. Continuing growth of awareness of own capabilities.
7. Minimal exposure to life/career role models.	7. Significant exposure to life/career role models.
8. Minimal self-confidence and developing sense of maturity.	8. Developed and diversified self-confidence and maturity.
9. Introspective orientation.	9. Varied self/other orientation.
10. Impulsive (short-term) decision making.	10. Capacity for delayed gratification and long-term decision making.
11. Limited exposure to strategies for learning.	11. Varied strategies to learning.
12. Passive learner role.	12. Active learner role.
13. Limited history of self-directed learning.	13. Diversified opportunities for prior development of self-directed learning.
14. Minimal analytical critical problem-solving skills.	14. Developed analytical critical problem-solving skills.
15. Limited prior life experience.	15. Varied rich life opportunites and experiences.

SUMMARY

Ackell (1980) suggests that change is hardly ever easy, and growth is almost always incremental. People and organizations adapt to the present by building on a foundation of behaviors and structures developed in the past. Growth comes rapidly and easily in one area, slowly and with difficulty in other areas. But change does happen.

He suggests that there are several key developmental points in the evolution of a truly equitable model for re-entry education that can perhaps make the evolution a less painful process:

1. When a university has developed a substantial adult constituency, it should modify its mission statement to express clearly a commitment to adults and should assure that this change is fully understood and endorsed by the governing board.
2. The president and executive staff, especially the chief academic officers, must clearly, frequently, and consistently articulate the university's commitment regarding adult students to all university employees.
3. University long-range planning must consistently address the needs of adults as a major constituency of the university.
4. Offices of Student Life, Admissions, Registration, Financial Aid, Career Planning and Placement, and Counseling should be made aware that a substantial portion of the student body is over the age of 25 and aging and in need of their support.
5. The university should consistently work to develop a personal and institutional philosophy that embraces a commitment to serve and educate adults as equal members of the academic community.
6. Institutions should clearly and thoughtfully address the differences between traditional requirements for admissions, transfer, residency, and the real requirements necessitated by academic programs.
7. Appropriate classes, schedules and course continuations should be offered at times and places convenient to the total student body.
8. Universities need to recognize that adult students have schedules different from those of traditional students and thus require longer, later operation hours for many university functions and support services (bookstore hours, library hours, etc.). (Ackell, 1982)

The re-entry student is a consumer. The institution offers the product. There seems to be a need for an awareness of the problems each creates for the other. Universities need to be aware of the potential student market, adult students' needs, and the institution's responsibility to these adults as they become more and more numerous on the campus. Adult students need to be concerned with the impact they are having on the institutions and the traditional student body. Most importantly, adult students may have to realize that changes in traditional structures to accommodate adults and their time frames will take time and continued effort, and may not come as easily or readily as most adults would hope. Adult students as a group represent more diversity in life situations, goals, previous experiences, skill, intellectural capacities and styles of learning than most institutions are accustomed to acknowledging or planning for. A realistic awareness of this diversity is important for the institution and the student.

Perhaps what is most important is an awareness of what this can mean in terms of educational quality for the institution, the traditional student body and the non-traditional and re-entry student body. Educational institutions must learn to serve the students they do and could have, not continue in ways that served those they once had.

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AN IN-HOUSE TRAINING PROGRAM TO CORRECT MATHEMATICS AND CHEMISTRY DEFICIENCIES AT LOS ALAMOS NATIONAL LABORATORY

by

Helena Whyte

Los Alamos National Laboratory

Abstract:

The Laboratory has been offering in-house training to improve basic mathematics skills since 1979. The eight module math continuum is structured so that it can successfully correct and identify basic skills and knowledge deficiencies of Los Alamos National Laboratory technician employees.

The Laboratory has also designed a training program in chemistry that has been offered since 1981. The target group of chemical technician employees has serious deficiencies in basic chemistry skills and knowledge resulting in poor motivation and problems in laboratory safety. The chemistry continuum is composed of nine modules that are based on a practical laboratory approach.

The development and interrelationships of these two programs will be discussed in terms of job performance analysis, task analysis, training design, and performance measures. The results, revisions, and comments from past participants will also be shared.

INTRODUCTION:

The Training Office (PA-15) at Los Alamos National Laboratory has designed and developed a training/education program for the Laboratory's technicians. This organization provides a program that will successfully, within one year, correct identified basc skills and knowledge deficiencies of the technician employees. Within three years the program can achieve a long-term goal of developing a para- profesional technician team member.

PROBLEM STATEMENT:

Technicians at the Laboratory need to correct and improve skills and knowledge deficiencies. There is a need to increase their safety awareness and to impact the image of themselves as para-professional technicians

The target group of technician employees represents a segment of the employee population for whom the problem statement need is especially acute. The target group has serious deficiencies in basic chemistry skills and knowledge. The implications for problems in laboratory safety because of these deficiencies and general lack of awareness are serious. The technicians are poorly motivated and not academically prepared for the work they must do. An identified need exists to motivate these employees to learn basic concepts in applied chemistry and related practical mathematics and to raise their awareness of safety considerations.

PROGRAM DESIGN:

In the early sixties, the American Chemical Society became concerned about the role of the technician. The heart of the problem seemed to be that technology instructors were forced to adopt university-level texts for students who did not need,were not interested in, and could not understand the abstract principles which formed the basis of the texts. There is little doubt that the first two years of a four-year university curriculum is not a

satisfactory preparation for a chemical technician. The typical university course emphasizes the broad theoretical foundations of chemistry and the accompanying laboratories serve to augment the student's understanding. Courses for technicians should be based on a practical laboratory approach supplemented by enough theory to explain what the experiment shows.

Programs to train chemical technicians have been available in a number of two-year community colleges, junior colleges, and technical institutes. Most of these programs have included standard university-type courses in general, analytical, and organic chemistry taught in much the same manner and with the same texts as their university counterparts. Students who could survive this type of program were not content to become technicians and instead went on to finish a four-year program. The vast majority of students who did not survive did not become technicians either. This latter group of students, who had some interest in chemistry but could not survive a standard university curriculum, is the very group who should have become technicians. The end result has been frustration for students and instructors.

The PA-15 training program models its design on the Chemical Technician Curriculum Project (ChemTeC). This project began in 1969 with a National Science Foundation Grant to the American Chemical Society for development of instructional materials to be used in the chemistry core of technician training programs. The ChemTeC Project is aimed at training chemical technicians, primarily at two-year colleges, for subsequent employment in industry and R & D labs. Guidelines for the PA-15 program are:

1. Keep the language simple and conversational.
2. Do not use so many words that what should be easy becomes difficult.
3. Adopt a phenomenological approach. Do, observe, interpret, and then explain the concepts, rather than do experiments to illustrate abstract ideas.

4. Give reasons behind the facts where appropriate.

5. Justify why a topic is important to the student.

6. Use experiments related to common experience where possible.

7. Keep the mathematics to elementary algebra, logarithms, and graphs.

8. Repeat concepts with a gradual increasing of sophistication and a broadening of significance.

9. Think in terms of questions the student should be able to answer.

This program's imperative is to involve students in **doing**. The stress is on application rather than theory. Being technique-oriented, the technician should be able to take the burden of routine laboratory operations from the professional staff member, thereby allowing the latter more time to concentrate on the broader aspects of the job.

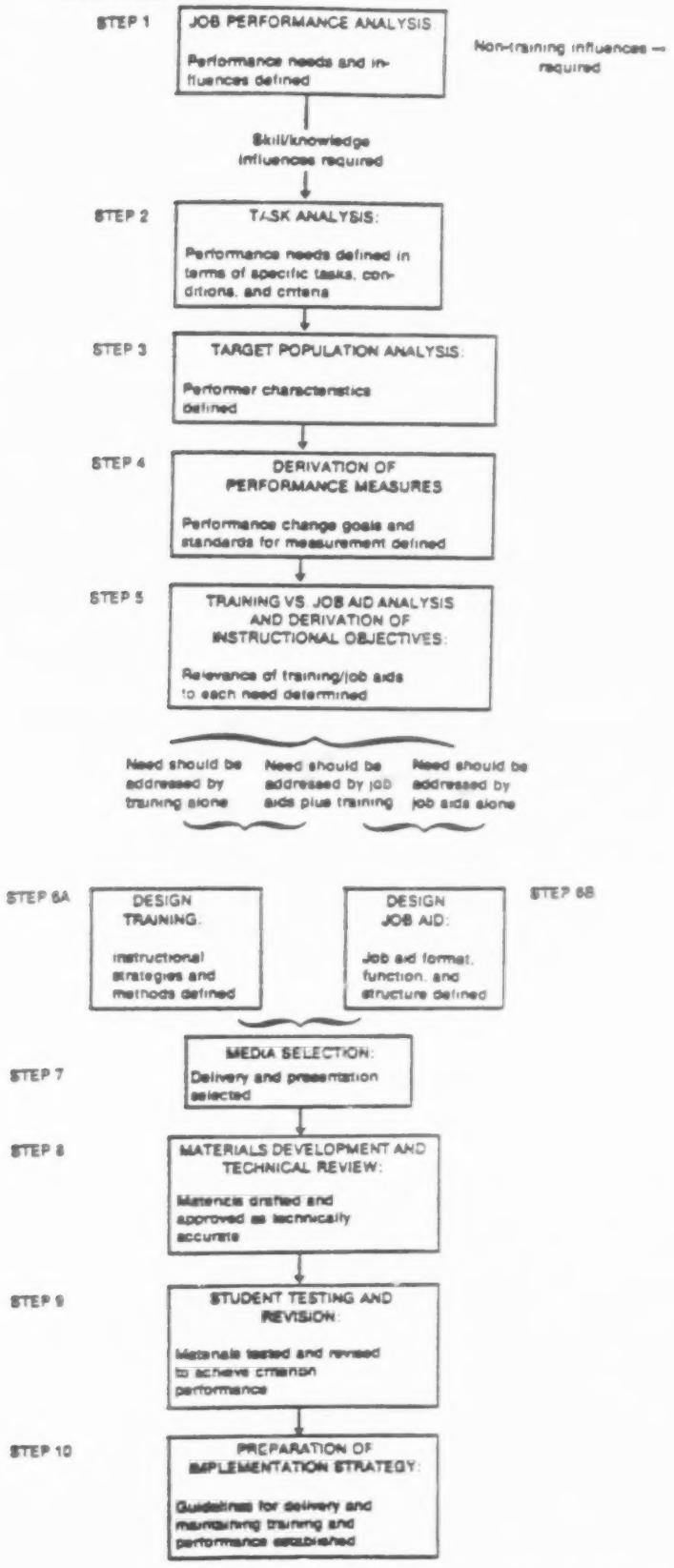
Detailed knowledge of mathematics, other than familiarity with algebra, isn't a prerequisite, nor is a previous knowledge of chemistry. Mathematics can be made palatable to weak students if it is taught in the proper context.

CURRICULUM DEVELOPMENT:

"Fundamentals of Chemistry" was first taught in 1980 at the request of one of the Laboratory managers. Other managers heard of the short course and asked to take part. Managers and technicians realized that Fundamentals of Chemistry was only a "bandaid" to the need for training. Thus the Chemistry Module Series has evolved over the years as seen in Table 1. Most technicians needing chemistry training work in radiochemical, explosive, analytical, geologic, or health related groups. I was once a supervisor in a radiochemical group and an analytical group so I was aware of the tasks involved in carrying on these various jobs. I began working with this program in August 1982. The strategy in Figure 1 was used to determine the module names and sequences.

Figure 1.

Instructional Systems Development: Steps and Outcomes


STEP 1
JOB PERFORMANCE ANALYSIS:
Performance needs and influences defined
Non-training influences required
Skill/knowledge influences required
STEP 2
TASK ANALYSIS:
Performance needs defined in terms of specific tasks, conditions, and criteria
STEP 3
TARGET POPULATION ANALYSIS:
Performer characteristics defined
STEP 4
DERIVATION OF PERFORMANCE MEASURES
Performance change goals and standards for measurement defined
STEP 5
TRAINING VS JOB AID ANALYSIS AND DERIVATION OF INSTRUCTIONAL OBJECTIVES:
Relevance of training/job aids to each need determined
Need should be addressed by training alone
Need should be addressed by job aids plus training
Need should be addressed by job aids alone
STEP 6A
DESIGN TRAINING:
Instructional strategies and methods defined
STEP 6B
DESIGN JOB AID:
Job aid format, function, and structure defined
STEP 7
MEDIA SELECTION:
Delivery and presentation selected
STEP 8
MATERIALS DEVELOPMENT AND TECHNICAL REVIEW:
Materials drafted and approved as technically accurate
STEP 9
STUDENT TESTING AND REVISION:
Materials tested and revised to achieve criterion performance
STEP 10
PREPARATION OF IMPLEMENTATION STRATEGY:
Guidelines for delivery and maintaining training and performance established

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The following table shows the evolution of the chemistry continuum.

Table 1.

FY 80-82	FY 83	FY 84	FY85
Fundamentals of Chemistry	Applied Chemistry for Techs I & II	Applied Chemistry for Techs	Applied Chemistry for Techs
	Analytical Chemistry	Analytical Chemistry	Analytical Chemistry
	Chemical Instrumentation Technology	Introduction to Radiochemistry	Chemical Laboratory Procedures & Techniques
	Chemical Laboratory Procedures and Techniques	Technology of Materials	Chemistry of Hazardous Materials
	Introduction to Radiochemistry		Chromatographic Techniques
			Introduction to Radiochemistry
			Intermediate Radiochemistry

It is a well-established precept that successful performance in Chemistry courses requires appropriate mathematical knowledge and skill.

The Math Continuum is unlike an academic program in several ways:

- The Math Continuum is structured so that it can successfully correct and identify basic skills and knowledge deficiencies of Los Alamos National Laboratory technician employees.
- The instructors in the mathematics programs are particularly qualified to teach adult students with learning deficiencies. The program's success rates attest to the skill and competency of the instructors.
- The Mathematics Continuum allows students entrance to and exit from a number of programs, both degreed and nondegreed, Figure 2.
- Most importantly, the mathematics continuum builds and reinforces self-image in the students.

Students are given a pretest to determine where they enter the program. We have found that many of our technicians need to take one or two modules in the Math Continuum before progressing to our Chemistry series.

The Chemistry Continuum is presented in Figure 3. The Chemistry curriculum also allows students entrance to and exit from a number of programs. Students with no previous background in Chemistry begin either with Applied Chemistry in the series or a beginning level University course.

Continuing Education Mathematics Program Integrated with Chemistry and Physics

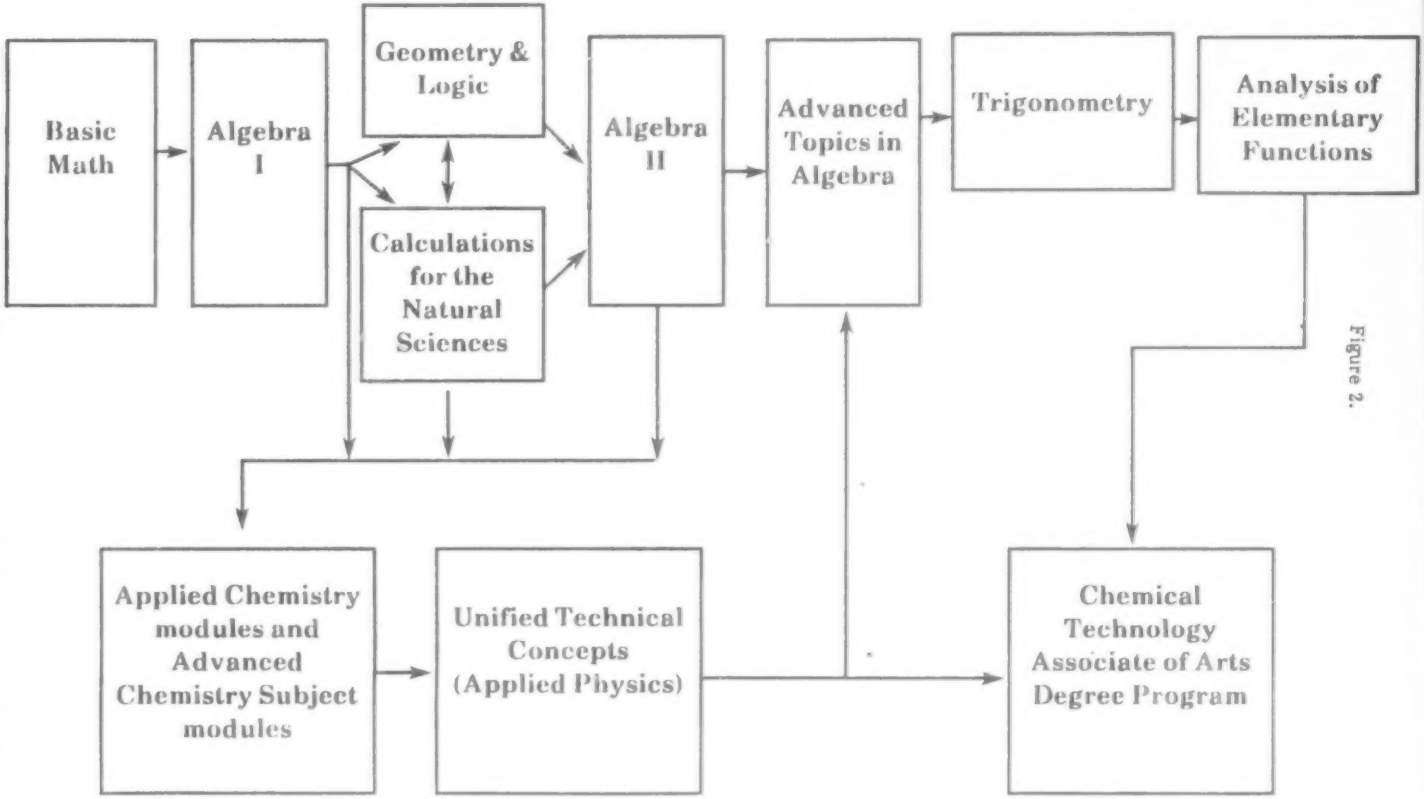

Figure 2.

Systematic Training Program for Los Alamos National Laboratory Chemical Technicians

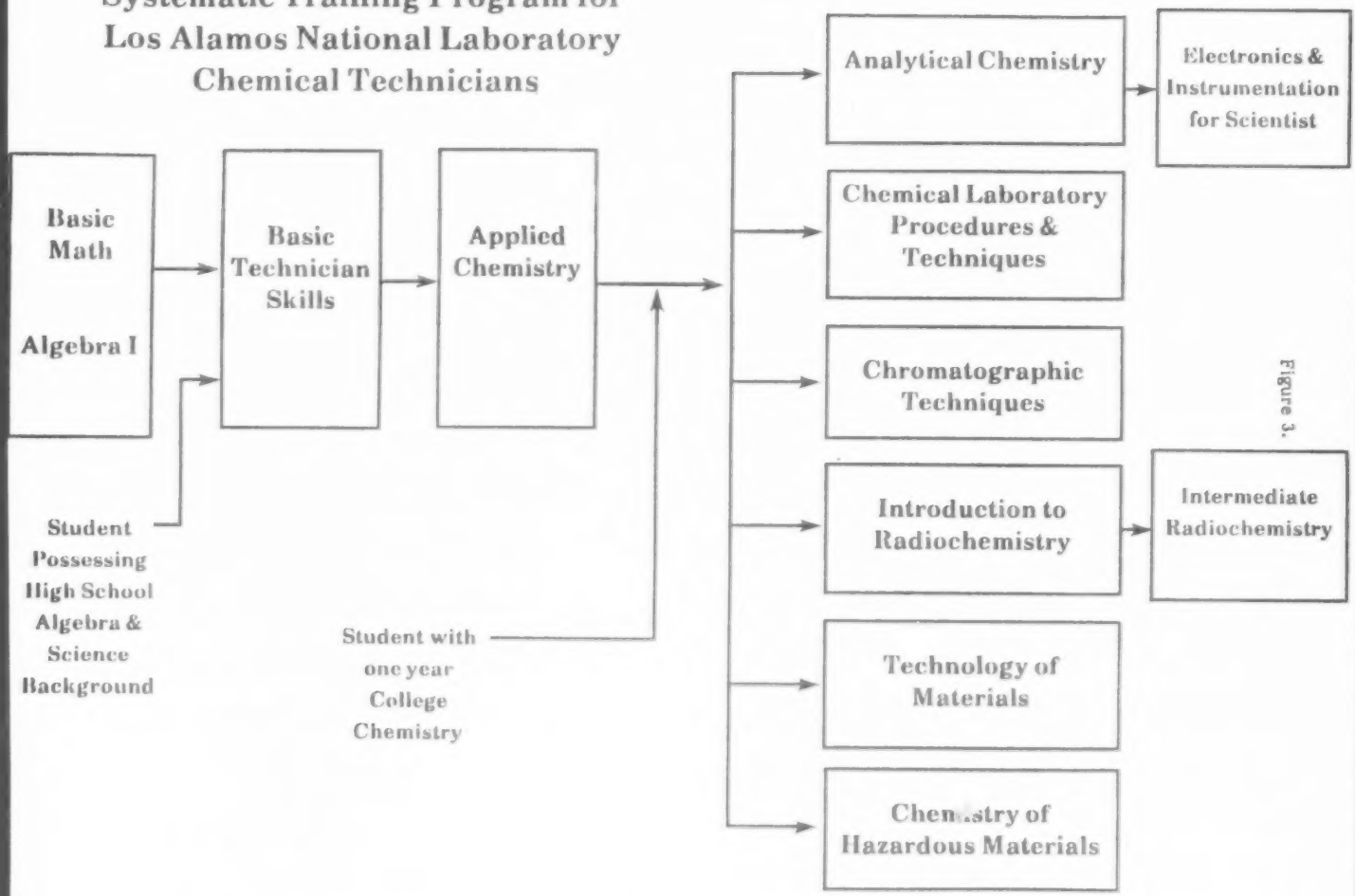

Figure 3.

After introductory work is done, students take only those modules that directly relate to their job assignment.

The training program's objectives are:

- To train students in the safe and accurate use of common laboratory techniques.
- To acquaint students with the language of chemistry.
- To teach the basic chemical principles.
- To teach some descriptive chemistry as it is currently used.
- To skillfully accumulate and present data.
- To recognize inconsistencies in data; to distinguish good data from bad.
- To have some feeling for the basic statistical significance of experimental results; to make routine calculations.
- To sufficiently understand chemistry to appreciate the meaning of results (although actual data interpretation is the responsibility of the professional personnel).
- To select, understand, and carry out procedures accurately and safely.
- To converse in the language of chemistry and to report one's work in a proper fashion.

These measurable program outcomes help to alleviate the problem of the target group's assessed need and assist in the development of professional technicians at the Laboratory.

COURSE DELIVERY:

The PA-15 mathematics programs run for ten week intervals. Students meet with the instructor twice a week for an hour and a half. Classes meet during working hours so that class attendance becomes part of the job assignment. Each math module consists of 30

contact hours. A pre-test is given during the first class period. A post- test is given at the conclusion of the course with a certificate of completion being issued to those demonstrating a 70% or higher proficiency level on the test. We have trained 470 students since 1979. Ninety-seven percent of the participants successfully complete the course the first time through. Those who are unsuccessful, usually have a poor attendance history or were marginally allowed access to that level of study. Mathematics texts are listed in Table 2. Texts are chosen for readability, clarity of examples, and immediate availability of answers.

The PA-15 Chemistry programs run for five days concurrently from 8:30 a.m. - 4:30 p.m. Each Chemistry module is an intense learning experience. A pre-test is given during the opening hours of the course. A post-test is given at the conclusion of the course with a certificate of completion. We have trained 170 students since 1980. Students generally increased their scores by 41% during this one week interval. Students who have completed more than one module on the continuum generally score higher on both the pre-test and the post-test. The instructors in the Chemistry program are particularly qualified to teach adult learners with learning deficiencies. These instructors also have extensive experience training technicians and have had industrial, as well as, teaching experience. The Chemistry texts are listed in Table 3. Chemistry texts are chosen for readability, content, and possible use as a later reference.

Table 2. Mathematics Texts Used:

Basic Math	Basic Mathematical Skills: A Guided Approach; Carmen and Carmen, John Wiley & Sons, Inc., 1981.
Algebra I	Introductory Algebra; Keedy & Bittinger, Addison-Wesley Publishing Co., 1983.
Intermediate Algebra	Intermediate Algebra: A Guided Approach; Carmen and Carmen, John Wiley & Sons, Inc., 1980.
Advanced Topics in Algebra	Intermediate Algebra: A Guided Approach; Carmen and Carmen, John Wiley & Sons, Inc., 1980.
Geometry and Logic	Introductory Geometry; M.K. Hudspeth, Addison-Wesley Publishing Co., 1983.
Calculations for the Natural Sciences	Schaum's Outline Series: Physical Science; A Beiser, McGraw-Hill, 1974.
Trigonometry	Plane Trigonometry: A New Approach; C.L. Johnston, Prentice-Hall, Inc., 1978.

Table 3. Chemistry Texts Used:

Applied Chemistry	Basic Chemistry; Seese & Daub, Prentice-Hall, Inc., 1981
Analytical Chemistry	An Introduction to Chemical Analysis; Harris & Kratochvil, Saunders College Publishing, 1981.
Chemical Laboratory Procedures & Techniques	Chemical Technicians' Ready Reference Handbook; Shugar, Bauman and Bauman, McGraw-Hill, 1981.
Introduction to Radiochemistry	Principles of Radioisotope Methodology; Chase & Rabinowitz, Burgess Publishing Co., 1967.
Intermediate Radiochemistry	Principles of Radioisotope Methodology, Chase & Rabinowitz, Burgess Publishing Co., 1967.
Technology of Materials	Materials Science and Metallurgy; Pollack, Reston Publishing Co., Inc., 1981.
Chemistry of Hazardous Materials	Chemistry of Hazardous Materials; Meyer, Prentice-Hall.
Electronics & Instrumentation for Scientists	Electronics and Instrumentation for Scientists; Malmstadt, Enke and Crouch; Benjamin Cummings Publisher.

EVALUATION:

As indicated earlier, student performance is measured using pre- and post-tests. The 97% proficiency rate for the mathematics students and the average 41 point gain for the Chemistry students shows the success of our programs. An historical look at the pre- and post-test Chemistry data is shown in Table 4.

Table 4:

Course Title	Year	Pre-Test Average	Post-Test Average
Applied Chemistry for Technicians	1983	30	81
	1984	47	86
Analytical Chemistry	1982	29	77
	1983	32	66
	1984	45	90
Chemical Laboratory Procedures and Techniques	1983	32	58
Introduction to Radiochemistry	1983	30	85
	1984	54	94
Technology of Materials	1984	44	66

However, PA-15 is not not satisfied with just these results. PA-15 also has the students fill out an evaluation for the course. The responses help PA-15 to update and revise courses. These responses also help PA-15 to determine what other training needs the technicians have.

The questions asked on the evaluation form are:

1. How will you apply the material from this course to your job?
2. What did you most enjoy about the course?
3. What did you least enjoy about the course?
4. What suggestions do you have for improvement of this course?
5. Are there any other courses you would like to see offered?

Here are some student responses:

"It has improved my self-image to know that I can still learn and feel more intelligent with my co-workers who have a higher education than I do."

"I work in computers and find the need for math and the lack of math anxiety useful. I expect to continue in the math series to further my math skills and aid in my further progress with computer science."

"I write computer graphics user documentation, and learning the geometry/logic concepts will enable me to describe graphic concepts much better for users."

"I will use the material in applying some of the basic equations and formulae to practical problems encountered on the job."

"I can better understand a staff member when he is explaining things in chemical terminology."

"I am more confident; I am a more valuable employee because of my increased chemical knowledge."

"Most all the material in this course I will apply and have applied at my job. I have been able to be more independent in working out problems. I have learned chemistry terms and can understand them."

"I have a better understanding of the processes at work. Now I know why and how things are done. I get personal satisfaction and I feel more confident at work, and that's a good feeling."

"I can apply it to my job because I'm involved with a lot of titration and I have a greater knowledge of how to use the various calculations."

"I learned more about counting systems and a better understanding of formulae I use very frequently; on the whole this course has filled in some gaps and given me a better sense of confidence."

I learned many sampling techniques and ways to solve problems...also how to piece together different parts of a puzzle to find the complete picture."

"It will come in handy to know which solvents will dissolve which."

"The coursework on phase diagrams was directly related to my work. The study of steel gave me an overall intuitive comprehension of the behavior of metals."

PA-15 would still like to do more in terms of cost effective analysis. The best way to determine the skill proficiency is to visit the technician on the job before and after the class, but this is costly and time consuming. I am currently developing an evaluative instrument in the affective domain to determine if job performance has improved. An example of such an instrument is shown in Figure 4. James Popham and Elanna Yallow of IOX Assessment Associates in California have shown that such an instrument can be valuable and time effective.

CONCLUSION:

The success of the Laboratory's Training program is best expressed by this student comment: "The course not only increased my job awareness but enabled me to communicate to supervisors and staff members in technical terms thus making for a better working environment." This indicates achievement of the long-term goal of developing a para-professional from an employee who lacked chemical and safety knowledge and was poorly motivated.

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Figure 4.

The survey describes some expected outcomes of the 9-month Chemistry for Technicians course (August 1984 - May 1984). Circle YES or NO to show whether this statement applies to your situation.

If you circle YES, then use the confidence scale to show how certain you are of this ability/feeling.

The following examples show how the confidence scale is used.

Skill Examples	CAN YOU DO THIS?	IF YES HOW CERTAIN ARE YOU?
You can balance equations.	(YES)/NO	90
You can write a quarterly report.	YES/NO	___

Confidence Scale

10 20 30 40 50 60 70 80 90 100
Very Uncertain — Somewhat Certain — Very Certain

TECHNICIAN SURVEY

TASKS FOR TECHNICIANS OF TRAINING PROGRAMS		EXPECTED OUTCOMES	IF YES, HOW CERTAIN ARE YOU?
1.	I understand my job better because I had **Chemistry for Technicians.**	YES/NO	___
2.	I better understand the directions my supervisor gives me because I took **Chemistry for Technicians.**	YES/NO	___
3.	I can learn a new procedure on the job faster because I took **Chemistry for Technicians.**	YES/NO	___
4.	I can better communicate with my supervisor (i.e., job performance, work problems, etc.) because I took **Chemistry for Technicians.**	YES/NO	___
5.	I feel better about myself as a person because I took **Chemistry for Technicians.**	YES/NO	___
	What final grade did you receive?	_____	
6.	I use the lecture material on my job.	YES/NO	___
7.	I use the laboratory techniques learned on my job.	YES/NO	___
8.	I use the report writing skills learned on my job.	YES/NO	___
9.	My expectations concerning the outcome of the course were met.	YES/NO	___
	Please give reasons if answer is no.		
10.	I am taking U.N.M. course work this semester.	YES/NO	___
11.	I plan to pursue an associate degree at U.N.M.	YES/NO	___
12.	I have taken additional training at PA-13.	YES/NO	___
13.	I plan to take further training at PA-13.	YES/NO	___
14.	Any comments you would like to make? (Particularly comment on how your work life changed as a result of completing **Chemistry for Technicians.**)		

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QUEST FOR QUALITY

by

Donald C. Roush

Executive Vice President

New Mexico State University

It is a great pleasure to dedicate this "Last Lecture" to Dr. Verna L. Vickery, Professor of Education and Specialist in Reading at NMSU from 1962 to 1970. Dr. Vickery, an inspiring teacher, had considerable impact upon those she taught, and through her expertise and dedicated service, had a marked effect upon the improvement of reading program in the public schools of New Mexico.

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This may be the last opportunity I will have to visit with you about teaching. As you know, I plan to terminate from the university on June 30, and pursue another career. Notice, I am not going to retire; I learned three or four years ago not to talk about my retirement at the university--and with good reason. In leaving Hadley Hall one day, I met Dr. Newman Reed, emeritus head of the English department. Newman is known for his dry wit. I said, "Hi, Newman, how are you?" "Just fine." I said, "Are you enjoying retirement?" "Don, it's the best decision I ever made." I said, "I sure am looking forward to the day when I retire," and without hesitation Newman replied, "Yes, Don, and there are a lot of others around here looking forward to that day, too."

It has been my great privilege as the chief academic officer of the university to work with three presidents. Many of you know that I remained this extra year to provide continuity of the operation and give President Halligan the opportunity to choose the next executive vice president. It is a pleasure to work with Dr. Halligan; I predict he will be another great president. Also, I would like to say how very, very proud I am of the faculty we have been able to attract and retain at the university. The productivity of the faculty speaks for itself as we look back on the progress we have made.

The paper I will present today has two parts--the first includes a discussion of faculty researchers and teachers--some ironies, arrangements, and a major recommendation; in the second part, I present what I believe are the three most essential components of effective teaching.

As I talk about teaching today, understand that I am cognizant of the importance of research. There is no need to decide whether one is more important than the other. We know that scholarly work enhances teaching, and

vice versa. But a major unresolved problem is the short shrift teaching receives in the reward system compared to research. This problem is the inevitable result of the differences in opportunities. For example, as faculty members write up their research and compete in the marketplace for the results to be published in a refereed journal, they are able to submit very factual evidence of accomplishments. As more and more articles are published, researchers often receive national and international recognition for their work. Research opens doors of opportunity for additional extrinsic recognition and rewards through the funding of grants and contracts which generate needed overhead funds for the university, the college, and the department.

These opportunities are pursued at NMSU with considerable success--as they should be. The problem is that none of the above applies to teaching.

Fortunately, the faculty researcher is also concerned about being an effective teacher, but the teaching evidence he/she submits cannot equal the evidence of research accomplishments. Although the faculty researcher may be a star in the classroom, it is unlikely his/her teaching reputation will exceed the boundaries of the campus. Consequently, an average or even below-average teacher, but a productive researcher and writer, has an easier time with the award of tenure, promotions, and salary increases. These disproportionate salary increases for the researcher, ironically, come from funds generated through the production of student credit hours--in other words, the teaching of students. Teaching supports research rewards, and inevitably, the successful researcher spends less and less time in the classroom. Good teaching comes out on the short end--twice--in spite of the fact that President Halligan and many others have declared that teaching

students at the university is our most important priority and the very reason for our existence.

Given all of this, it would seem logical to establish some different arrangements for teaching. These arrangements would include great care in the evaluation and reward of teaching. The rewards for teaching would be equal to or exceed those of research, because the only extrinsic recognition great teachers receive in the reward system is that given to them by the university itself. If teaching and research are to be equally rewarded, we would give more of our attention to the exploration of ways to build a higher confidence level in the evaluation of teaching, followed by clearly understood and effective rewards. We have been attempting to do precisely those things for a number of years on this campus and, in my experiences visiting other universities, we are far ahead in our efforts. Currently, recommendations on evaluating and rewarding teaching, prepared by the President's Committee on College Teaching and the deans' council, are being discussed in the departments which hopefully will lead to the adoption of recommendations contained in this paper.

It is true, as some faculty members have exhorted, that the instruments to measure teaching are imperfect. But it is also true that the instruments we use to measure student learning are imperfect. Thus it is incongruous, if not hypocritical, to assume a posture that teaching escapes evaluation because the measuring instruments are imperfect. We are not constrained in our attempts to evaluate students. The same should apply to the evaluation of teaching.

Surely, an institution dedicated to searching for the truth can develop programs for effective teaching and its evaluation. But, for many reasons, seeking the truth does not seem to apply to teaching. Very few faculty

members on our campus, or on any other campus for that matter, engage in pursuing the unknowns about teaching effectiveness, evaluation, and reward. For example, in my searches of the literature on research about college teaching in 1976, 1979, and 1983, I found only 15 articles worthy of inclusion in my seminar paper on testing and grading. At the same time, I am certain that hundreds of attempts have been made by faculty to improve instruments in the measurement of student learning and to grade students in a fair manner. Unfortunately that information remains largely unpublished, because few faculty members on any university campus would dare devote their research interests to the improvement and evaluation of teaching, as opposed to research in a specific discipline. Formidable limits are placed upon those who would seek the truth about teaching and learning, and these obstacles suggest yet another irony, i.e., the benign neglect of research in teaching is the very reason we have so little confidence in the measurement of its effectiveness.

The need for research in teaching is next to unbelievable, as can be demonstrated by the following quote from Milton and Edgerly:[1]

> There are slightly more than a half million faculty members in American colleges and universities. If each teaches an average of two courses and prepares three tests for each course, at least 3 million exams are given during any quarter or semester. Since these examinations are administered to about 10 million students, about 30 million tests are given every 3 or 4 months, or over 100 million every academic year. This is measurement on a grand scale indeed.
>
> Considering that major decisions are made about students' lives, whether they remain in school, enter professional or graduate institutions, secure jobs, partially on the basis of those hallowed test statistics--the grade-point average--elaborate care

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1 Ohmer Milton and John W. Edgerly, "The Testing and Grading of Students," Change, Change Magazine and Educational Change, 1976.

should be required in the entire testing and grading enterprise.

One could reasonably expect that elaborate care would include provisions for research. More academic sins, mostly unintentional, are created in testing and grading than in any other phase of teaching. Somehow, better arrangements must be found to encourage research about effective teaching, and bring to a close the long-standing, unintentional discrimination against teaching. I recommend the immediate formulation and implementation of an "R and R Program"--Recognition and Reward for those who excel as teachers and as researchers in teaching. An enlightened university such as this one has the opportunity to rescue teaching from the intellectual, moral, and social darkness which has surrounded it for so many years. Make no mistake about it, without this kind of justice, teaching will not receive its just reward.

If former Governor Bruce King were present at this point in my talk, he would more than likely say, "Dean Roush, you sure have opened a box of pandoras."

Any serious quest for quality in teaching, such as the proposed R&R Program, must include at least five arrangements:

1. Provisions for faculty to become more effective teachers,
2. Provisions for research about teaching and learning,
3. Incentives to excel in teaching,
4. Generous rewards for effective teachers, and
5. Demonstrable actions which convey that good teaching is highly valued.

Sometimes these five arrangements seem out-of-reach. But do not despair. Successful faculty, both teachers and researchers, are driven by a powerful force, one which makes all teaching worthwhile--that is to witness

learning in others, the satisfaction of seeing our students become wiser, more knowledgeable, and more sure of themselves.

One of the most thrilling experiences in life is to teach others. Teaching is a marvelous and exciting profession, but the intrinsic opportunities to experience this excitement, to nurture the minds and lives of students cannot continue to serve as the only reward.

Words taken from the Report of the National Commission on Excellence in Education, A Nation at Risk,[2] help express a perfect conclusion to the first part of this paper--The twin goals of teaching and research have profound meaning to the university, and we cannot permit one to yield to the other in principle or in practice.

In part II, I wish to share with you the three most critical components of teaching which absolutely make a major difference in the teacher's successful quest for quality.

These conclusions are drawn from studies of the literature on college teaching and from hundreds of faculty participants in my seminars.

Organizing for teaching is the first component. The planning faculty members do before the first class meeting has a marked effect on the success of the teacher and the learner. This conclusion is based upon the following principles and assumptions:

1. Every teaching decision is driven by the stated purposes of the course. Thus, the goals of a given course are selected with great care and tested for appropriateness through the use of a matrix where every part of a course meets one or more of the stated goals. The exercise ensures consistency, avoids classroom management problems, and makes learning easier.

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2 Jack R. Sharpe, Jr., "Book Reviews," National Forum: Phi Kappa Phi Journal, Winter 1984.

2. The average attention span of college students does not exceed 20 minutes. Moreover, Hartley and Davies in 1978 found in their studies of student attention during lectures that, "typically, attention increases from the beginning of the lecture to 10 minutes and decreases after that point. Evidence collected shows that after the lecture, students recalled 70 percent of the material covered in the first 10 minutes and only 20 percent of the material covered in the last 10 minutes."[3] Lectures which continue without interruption beyond 15 or 20 minutes are an inefficient use of student and faculty time. Thus, if we are to take full advantage of the opportunity during a 50-minute class to see that students learn as much as they possibly can, good planning is required. The organizational implications are enormous.

3. Students learn more when they are exposed to a number of teaching methods. The lecture is the least efficient teaching and learning mode. Lecturing is an effective way to present information, but an optimal combination of teaching methods is required to meet all student learning styles. Alternate ways for students to learn are selected from 26 teaching and learning modes. The inclusion of these alternatives requires astute planning.

4. High scholarly standards are clearly stated in both the rigor and currency of course content and the level of expected student performance with respect to those standards. The currency of a faculty member's information about a given course is and should be the primary responsibility of the faculty member, but at the same time departmental discussions are needed to update course syllabi, to keep up with the changes in the discipline, and to avoid duplication of information. Otherwise, organizing and planning take place in a vacuum.

5. In every course, the major ideas or concepts are clearly identified with specific facts taught in relationship to those concepts. Unstructured instruction is rapidly forgotten. This important faculty effort should also include discussions with peers in the discipline.

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3 J. Hartley and I. K. Davies, "Note-Taking: A Critical Review," Programmed Learning and Educational Technology. 1978, Volume 15.

6 The nature of the discipline, anticipated maturity level of the students to be taught, and finally, the adoption of teaching strategies which fit the skills of the instructor are crucial considerations. In most classes of 25 to 30, 5 to 7 students, or perhaps more, will be "lost" from time to time as the course proceeds. Planning should anticipate this fact and include alternative ways for students to catch up without unduly occupying the time of the professor. In many of the disciplines, this accommodation can be accomplished through technology, such as cassettes, floppy disks, and so forth. "Floppies" are now available for several introductory courses and, when students fall behind, they can easily be referred to this source of information.

7. Technology, properly applied, results in greater teaching efficiency. Technologies available are largely unused, but that will change as the demand for accountability in instructional programs increases, as it surely will, and we struggle with the problems of increasing amounts of knowledge to be taught and learned. Attempts to solve these problems through the use of the same traditional approaches to teaching, but with a fifth year added are not realistic in view of the extra time and costs which would be demanded of the student, nor do I think it is necessary. Through imaginative and creative use of technology, five years of information can be taught in four. But the impact on course planning is extensive.

8. The testing and grading of students greatly influence student performance. When the first test hits the student's desk, the "moment of truth" has arrived. Students take their cues from the manner in which they are evaluated and graded. When students are tested for facts, they learn to memorize; when students are tested for understanding, they learn to think. A test that is fair, impartial, reasonable, and consistent with everything the teacher has said gives students every opportunity to succeed.

I trust these eight assumptions demonstrate the critical importance of organizing for teaching. A faculty member told me after a teaching seminar that he realized the planning he did was more for himself than for the students. Clearly, students are the beneficiaries of effective course organization and planning.

The second critical teaching component is the motivation of learners. Motivation is the principal task of the instructor because of the high correlation between the amount of motivation and the amount of learning. Motivation is the cornerstone of any serious quest for quality in teaching.

Motivating learners is simultaneously challenging, complicated, traumatic, climactic, exciting, and wonderful--all of which is confirmed by the following assumptions:

1. Learning is of itself a great motivator. A faculty member from the Department of Mathematics in one of my seminars said, "Don, I have no problem with motivation. Mathematics is beautiful." When we help students reach that gestalt, commonly referred to as the "Aha, I understand," they are unusually motivated.

2. Learner participation, response, and experience contribute significantly to motivation.

3. Experiences related to the subject are crucial to motivation and learning. For example, Mark Twain said, "I never let my schooling interfere with my education." He recognized the critical need for the integration of student experiences with education and the extensive implications to motivation.

4. To motivate, teaching strategies are designed to enhance learner security, acceptance, self-esteem, and self-actualization; that is, the satisfaction of knowing something or achieving one's potential.

5. Raising the sights of students motivates them. My freshman students always asked the periennial question, "Dr. Roush, how long does this term paper have to be?" I always answered with another question, "How good do you want to be?" The effective motivator of students makes "have to" become "want to." Many of my freshman students, unfortunately not all of them, discovered that academic excellence was clearly within their reach.

6. Perhaps the most important factor in motivation is assumption 6--that learners can receive major motivations from the classroom climate or atmosphere. The climate in which learners find themselves can be a major deterrent or a major contributor to motivation. Classrooms which motivate are "user friendly."

7. Teachers also receive major motivations from the institutional climate or atmosphere. Motivated teachers motivate students. Motivated students drive us to do our best. The conditions where teaching takes place should be ideal, not just adequate.

8. And, finally, assumption 8--Teachers in their quest for quality know there is something special in everyone. Helping students discover and enhance that specialty is a most powerful motivator.

The third critical component is the selection and employment of teaching strategies. Effective teachers are clever strategists. These strategies include, but are not limited to, teaching and learning modes, student response and experiences, student confidence, and values related to the discipline.

Discussion in teaching is much more than the elicitation of questions and anwers. The teacher is interested in the quality of student response and employs strategies to evoke meaningful responses which serve as the vehicle for clarification of the lecture and the teaching of additional information related to the topic. Teaching from what students say is a most effective tool.

A teacher's quest for quality uses an array of some 26 teaching and learning modes to involve students in their own education--helping them apply ideas and facts in their lives and gain insights into current problems. The central purposes of these strategies are the comprehension and retention of information, helping students develop confidence in their ability to learn, and providing continuous student motivation.

But the most effective and least used teaching strategy is the inculcation of values related to the discipline in the teaching and learning plan. Why is student discussion of these values so powerful?

a. Perceptions are constantly infiltrated with values.

b. Values serve as the authorities in the name of which choices are made and actions are taken.[4]

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4 Richard C. Morrell, Teaching Values in College, Jossey-Bass Publishers, 1980.

c. What students do and believe depends upon their attitudes, philosophies, and value judgements.

Faculty in my teaching seminars always devote considerable time and discussion to these statements on values. I promise you the same will happen in your classrooms. And your students will 1) gain a deeper understanding of the subject, 2) display a greater interest in the subject, and 3) retain more information about the subject.

In summary, it is through these critical components--organizing, motivating, and postulating teaching strategies that our classrooms are more apt to serve as places where the zeal of the student to learn and the zeal for scholarship of the professor meet head-on. Teaching is a process of planning, organizing, motivating, evaluating, and strategically employing selected strategies. The effective teacher possesses an unquestioned command of the subject, passion and compassion--a passion for teaching and a compassion for those they teach. Teaching is the conscience of a university.

I will close this talk with another story about Mark Twain. When he had finished his book, Life on the Mississippi, he showed considerable diffidence and caution in its preface, apparently due to some abuse at the hands of his previous "scholarly" critics, by stating, "Persons attempting to find a motive in this narrative will be prosecuted. Persons attempting to find a moral in it will be banished; persons attempting to find a plot in it will be shot."[5]

Without any diffidence or caution whatever, I say to you that persons attempting to find a motive in my narrative, surely will. Persons attempting

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5 Dave Brinegar, "The Man From Hannibal," The American Way, June 1973.

to find a moral in it will be saints. Persons attempting to find a plot in it will not.

Most of you know that I am an eternal optimist--it is a requirement of the position. But, who knows, perhaps some of my dreams about teaching will come to pass. Warren Bennis said that "changing a university is more difficult than reorganizing a cemetery." But Mr. Bennis does not know that change is something we do very well at New Mexico State University.

BIOGRAPHY - DONALD C. ROUSH

In celebration of his 35 years dedicated to the improvement of teaching in New Mexico, New Mexico State University's Executive Vice President, Donald C. Roush, made a special address, "The Quest for Quality," at the Conference. Dr. Roush, who has announced plans to retire in July of 1985, has been involved in New Mexico education since 1950, when he began teaching in Los Alamos. There he was an elementary, junior and senior high school teacher as well as a high school principal. In 1955, he became director of field services for the New Mexico Education Association (now National Education Association - New Mexico).

Four years later, Dr. Roush joined the faculty of New Mexico State University and became Dean of the College of Education. He retained this position until the summer of 1968 when he was appointed Academic Vice President, with the title changing to Executive Vice President in 1979.

Dr. Roush is past president of the North Central Association and an examiner and consultant for North Central. He has published extensively in the field of education and is called on frequently as a consultant at both national and state levels. Over the last 21 years, his seminars on university teaching effectiveness have gained international recognition.

Dr. Roush received a bachelor's degree from Drake University and his doctorate from the University of Northern Colorado. In 1982, he was honored by the University of Northern Colorado as Outstanding Alumnus in the Field of Education.

New Mexico State University honored Dr. Roush in January 1983 with the President's Award for Service in recognition of a career dedicated to excellence in teaching as manifested by his outstanding work with faculty and students at New Mexico State University and other universities.

APPENDIX

DONALD C. ROUSH AWARDS FOR TEACHING EXCELLENCE - 1985

COLLEGE OF AGRICULTURE & HOME ECONOMICS

Lowell B. Catlett, Associate Professor, Agricultural Economics and Agricultural Business
Ph.D. - 1980, Iowa State University

COLLEGE OF ARTS & SCIENCES

Bradley A. Blake, Professor, Sociology and Anthropology
Ph.D. - 1970, University of Wisconsin, Madison

Vicente D. Villa, Professor, Biology
Sc.D. - 1969, Rice University

COLLEGE OF BUSINESS ADMINISTRATION & ECONOMICS

James Mensching, Associate Professor, Accounting & Finance
Ph.D. - 1976, University of Chicago, CPA

COLLEGE OF EDUCATION

Robert L. Gallegos, Associate Professor, Educational Specialties
Ph.D. - 1974, University of New Mexico

COLLEGE OF ENGINEERING

Satish J. Kamat, Professor, Industrial Engineering
Ph.D. - 1970, Texas Tech University

COLLEGE OF HUMAN & COMMUNITY SERVICES

John B. Savage, Academic Department Head, Professor, Health Science
Ph.D. - 1975, University of Utah

Jimmy E. Smith, Professor, Mathematics, NMSU-Alamogordo
Ph.D. - 1973, University of Texas, Austin

Judith A. Moore, Professor, English, NMSU-Carlsbad
M.A. - 1964, Western New Mexico University

Marvin G. Rider, Instructor, Secretarial Administration and Accounting, NMSU-Grants
M.A. - 1972, University of New Mexico

Barbara Raub, Assistant Professor, Secretarial Administration
NMSU - Dona Ana
M.S. - 1977, Eastern New Mexico University

Note: Recipients of the Donald C. Roush Awards for Teaching Excellence were chosen by the Deans of the six colleges at New Mexico State University based on input from a variety of sources including the results of the 1984 Commencement Survey.

Wednesday, January 9, 1985 & Thursday, January 10, 1985

10:30 a.m. - 1:30 p.m.

3:30 p.m. - 4:30 p.m.

COMMERCIAL DISPLAYS

DIGITAL EQUIPMENT CORPORATION (DEC)

HEWLETT-PACKARD CORPORATION

INTERNATIONAL BUSINESS MACHINES (IBM)

NATIONAL CASH REGISTER (NCR)

TANDY (RADIO SHACK) CORPORATION

HOLGUIN & ASSOCIATES CORPORATION

NEW MEXICO STATE UNIVERSITY FACULTY DISPLAYS

Center for Educational Development

Dr. Darwin Hunt - Experimental Training Center

Dr. Colleen Jackson - Department of Speech

Dr. Larry Reitmeyer - Department of Astronomy

COMMITTEE ON COLLEGE TEACHING

Lowell Catlett	College of Agriculture & Home Economics
Tom Cyrs	Center for Educational Development
Marie Heaton	College of Arts & Sciences
Jo Hill	College of Human & Community Services
William Kersting	College of Engineering
Margie Kitano	College of Education
John Loveland Chairman, 1984	College of Business Administration & Economics
Joseph Rogers Chairman, 1985	College of Arts & Sciences
M. E. Wolf	Office of the Vice President

CONFERENCE COORDINATORS

Carlton Dukes	Vendor Track Coordinator
Miriam Meyer	Program Coordinator

ALPHABETIC LISTING OF AUTHORS

Aasheim, L. J. (Kemmie)	Pacific Lutheran University
Baker, Greg	New Mexico State University
Balzer, Eugene W.	Northern Arizona University
Balyeat, John R.	United States Air Force Academy
Blake, Martin J.	New Mexico State University
Borrebach, David E.	LaRoche College
Burr, A. F.	New Mexico State University
Burr, Marjorie	New Mexico State University
Cartwright, G. Phillip	Pennsylvania State University
Chang, Moon K.	Peru State College
Conover, W. J.	Texas Tech University
Corder, Jim W.	Texas Christian University
Cowan, George	Los Alamos National Laboratory
Craver, Lionel	University of Texas at El Paso
Creel, Bob	New Mexico State University
Davis, Larry P.	United States Air Force Academy
Dingman, Paul R.	Oregon Graduate School of Professional Psychology
Donart, Gary	New Mexico State University
Duckworth, Victoria C.	University of Houston, Downtown College
Farrell, Mark O.	LaRoche College
Giordano, Gerard	New Mexico State University
Harris, Betty	New Mexico State University
Hoban, Michael T.	LaGuardia Community College, CUNY
Holmes, David R.	University of Vermont
Hunt, Darwin	New Mexico State University
Jones, Jesse L.	United States Air Force Academy
Jones, Lawrence G.	United States Air Force Academy
Jung, Phillip	United States Air Force Academy
Kirk, Edward L.	Abilene Christian University
Krause, Kenneth L.	United States Air Force Academy
Lier, Ruth	Los Alamos National Laboratory
Long, Richard L., Jr.	New Mexico State University
Lucking, Robert	Old Dominion University
Lujan, C. Lance	New Mexico State University
Marshall, James P.	University of Northern Colorado
May, William F.	Georgetown University
Merrill, M. David	University of Southern California
Moulton, Gary M.	Mind Nautilus Industries
Noetzel, Jonathan C.	United States Air Force Academy
Nordyke, James	New Mexico State University
O'Connor, Kathleen	Pacific Lutheran University
Potter, Eugenie	Arizona Research Associates
Randolph, Paul H.	Texas Tech University
Richards, Boyd	Hazeltine Corporation
Richardson, William E.	United States Air Force Academy
Ross, Eugene	New Mexico State University
Roueche, Suanne D.	University of Texas at Austin

ALPHABETIC LISTING OF AUTHORS

Roush, Dorald C.	New Mexico State University
Schreier, James W.	Marquette University
Schroder, Darrel	University of Texas at El Paso
Scott, Stanley S.	Peat, Marwick, Mitchell & Co.
Smith, Sara Dawn	University of New Mexico
Sproull, Frederick	LaRoche College
Storch, Donn M.	United States Air Force Academy
Strawser, Larry D.	United States Air Force Academy
Tarquin, Anthony	University of Texas at El Paso
Urquhart, N. Scott	New Mexico State University
Wade, James	University of Arizona
Walker, Kim B.	University of Colorado
Whyte, Helena	Los Alamos National Laboratory
Wright, James R.	United States Air Force Academy